HS2

November 2022

Construction Noise and Vibration Monthly Report – September 2022

North Warwickshire Borough Council

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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 North Warwickshire Borough Council (NWBC) area during the month of September 2022.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken at the Kingsbury Main Compound worksite (ref.: KMC), where work activities included services installation, trimming works, material movement, excavation works, road sweeping, water pipe installation and kerb installation.
- Noise monitoring was undertaken at the Birmingham & Fazeley Canal Viaduct worksite (ref.: BFCV), where work activities included platform construction, stone laying and excavation works.
- Noise and vibration monitoring were undertaken at the Marston Box/Marston Lane worksite (ref.: MB), where work activities included concrete works, formworks, steel fixing, excavation works, installation of temporary fencing, material haulage.
- Noise monitoring was undertaken at the Faraday Avenue Embankment and Underbridge worksite (ref.: FAEU), where work activities included stockpiling, piling works, material deliveries and movement.
- Noise monitoring was not undertaken at the Water Orton South Compound worksite (ref.: WOSC), where work activities included reinforcement, formwork, concrete works, earthworks and material deliveries.
- Noise monitoring was undertaken at the Attleboro Lane Overbridge worksite (ref.: ALO), where where no works were undertaken during the monitoring period.
- Noise monitoring was undertaken at the Gilson Drive worksite (ref.: GLD), where work activities included movement of aggregate, road sweeping, de-vegetation works.
- Noise monitoring was undertaken at the Birmingham Road worksite (ref.: BRD), where work activities included de-vegetation works, deliveries of materials, site compound in operation.
- Noise monitoring was undertaken at the Coleshill Heath Road worksite (ref.: CHR), where work activities included structure stabilisation works and sub-soil cutting.

- Noise monitoring was undertaken at the Packington Embankment worksite (ref.: PE), where work activities included embankment works, site investigation for extension of embankment, stockpiling, concrete removal and topsoil stripping.
- Noise monitoring was undertaken at the Bickenhill Cutting worksite (ref.: BIC), where work activities included site clean-up and piling works.
- Noise monitoring was undertaken at Diddington Lane Embankment (ref.: DLE), where no works were undertaken during the monitoring period.

Further works, where noise and vibration monitoring did not take place, were also undertaken at Gilson Road as part of sewer diversion works.

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 not exceeded due to HS2 works in the Local Authority Area during September 2022.

There was no exceedances of trigger levels, as defined in Section 61 consents during the reporting period.

Five (5) complaint was received within the North Warwickshire area during the monitoring period. A description of complaints, the results of investigations and any actions taken are detailed in Table 7 of this report.

Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +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 North Warwickshire Borough Council (NWBC) area for the period 1st to 30th September 2022.

1.1.3 Construction sites in the local authority area where monitoring was undertaken during this period include:

- Kingsbury Main Compound worksite, ref.: KMC (see Plan 1 in Appendix A), where work activities included:
    - Services installation, including electricity cables, ducts and chamber.
    - Trimming works.
    - Material movement.
    - Excavation works.
    - Road sweeping.
    - Water pipe installation.
    - Kerb Installation.

- Birmingham & Fazeley Canal Viaduct worksite, ref.: BFCV (see Plan 1 in Appendix A), where works included:
    - Platform construction.
    - Stone laying.
    - Excavation works.
- Marston Box/Marston Lane worksite, ref.: MB (see Plan 1 in Appendix A), where work activities included:
    - Concrete works.
    - Formwork.
    - Steel fixing.
    - Excavation works.
    - Installation of temporary fencing.
    - Material haulage.
- Faraday Avenue Embankment and Underbridge worksite, ref.: FAEU (see Plan 2 in Appendix A), work activities included:
    - Stockpiling.
    - Material deliveries and movement.
    - Piling works.
- Water Orton South Compound worksite, ref.: WOSC (see Plan 3 in Appendix A), work activities included:
    - Reinforcement, formwork and concrete works.
    - Earthworks.
    - Material deliveries.
- Attleboro Lane Overbridge worksite, ref.: ALO (see Plan 3 in Appendix A), where no works were undertaken during the monitoring period.

- Gilson Drive worksite, ref.: GLD (see Plan 3 in Appendix A), works activities included:
    - Movement of aggregate.
    - Road sweeping.
    - De-vegetation works.
- Birmingham Road worksite, ref.: BRD (see Plan 4 in Appendix A), work activities included:
    - De-vegetation works.
    - Deliveries of materials.
    - Site compound in operation.
- Coleshill Heath Road worksite, ref.: CHR (see Plan 5 in Appendix A), works activities included:
    - Structure stabilisation works, including material filling and installation of rigid inclusions.
    - Sub-soil cutting.
- Packington Embankment worksite, ref.: PE (see Plan 6 in Appendix A), works activities included:
    - Embankment works, including filling, laying and compaction works.
    - Site investigation for extension of embankment.
    - Stockpiling.
    - Concrete removal.
    - Topsoil stripping.
- Bickenhill Cutting worksite, ref.: BIC (see Plan 6 in Appendix A), works activities included:
    - Site clean-up.
    - Piling works.

- Diddington Lane Embankment worksite: ref.: DLE (see Plan 7 in Appendix A), where no works were undertaken during the monitoring period.

1.1.4 Further works, where noise and vibration monitoring did not take place, were also undertaken at Gilson Road as part of sewer diversion works.

1.1.5 The applicable standards, guidance, and monitoring methodology is outlined in the construction noise and vibration monitoring methodology report which can be found at the following location https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2. Noise and vibration monitoring reports for previous months can also be found at this location.

1.2 Measurement Locations

1.2.1 Fourteen (14) noise monitoring installations and eight (8) vibration monitoring installations were active in September in the NWBC area. Table 2 summarises the position of noise and vibration monitoring installations within the NWBC area in September 2022.

1.2.2 Noise levels measured at monitor location ref: BFCV-N1, worksite ref: BFCV across the month have been excluded as not representative of HS2 construction works due to interference from local residents at the address of the monitor. The monitor will be relocated once a new location is agreed.

1.2.3 A noise and vibration monitor was installed at ref: CHRU-N1-V1, worksite ref: CHR, on the Thursday 8th September 2022.

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

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
Kingsbury Main Compound (KMC)	KMC-N1	Kingsbury Road, Curdworth CP, Marston, Warwick, West Midlands
	KMC-N2	Kingsbury Road, Curdworth CP, Marston, Warwick, West Midlands
Birmingham Fazeley Canal Viaduct (BFCV)	BFCV-N1	Lock Cottage, Marston Lane, Curdworth CP, North Warwickshire
	BFCV-V1	Lock Cottage, Marston Lane, Curdworth CP, North Warwickshire
Marston Box (MB)	MB-N1	Kingsbury Road, Curdworth, Sutton Coldfield, West Midlands
	MB-V1	Kingsbury Road, Curdworth, Sutton Coldfield, West Midlands
Faraday Avenue Embankment and Underbridge (FAEU)	FAEU-N1	Orchard Cottage, Newlands Lane, Curdworth, Warwickshire
	FAEU-V1	Orchard Cottage, Newlands Lane, Curdworth, Warwickshire
Water Orton South Compound (WOSC)	WOSC-N1	53 Watton Lane, Water Orton CP, Warwickshire
	WOSC-V1	53 Watton Lane, Water Orton CP, Warwickshire
Attleboro Lane Overbridge (ALO)	ALO-N1	47 Attleboro Lane, Water Orton, Birmingham
	ALO-V1	47 Attleboro Lane, Water Orton, Birmingham
Gilson Drive (GLD)	GLD-N1	Gilson Dr, Coleshill, Birmingham
	GLD-V1	Gilson Dr, Coleshill, Birmingham
Birmingham Road (BRD)	BRD-N2	New Cottages, Birmingham Road, Coleshill, Birmingham
	BRD-V1	New Cottages, Birmingham Road, Coleshill, Birmingham
Coleshill Heath Road (CHR)	CHR-N1	Coleshill Heath Road, Coleshill Heath, Solihull
	CHRU-N1	276 Yorkminster Drive, Birmingham

Worksite Reference	Measurement Reference	Address
	CHRU-V1	276 Yorkminster Drive, Birmingham
Pakington Embankment (PE)	PE-N1	Common Farm, Chester Road, Coleshill, Birmingham
Bickenhill Cutting (BIC)	BIC-N1	Park Farm Barns, Chester Rd, Marston Green, Coventry
Diddington Lane Embankment (DLE)	DLE-N1	Hampton Hill Hounds, Nursery Cottage, Coventry Road, Bickenhill

2 Summary of Results

2.1 Summary of Measured Noise and Vibration Levels

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

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

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
KMC	KMC-N1	Kingsbury Road, Curdworth CP, Marston	Free-field	58.4 (61.9)	59.1 (64.1)	55.7 (59.9)	54.9 (59.0)	54.0 (61.7)	55.4 (57.3)	55.1 (57.2)	53.6 (57.5)	54.1 (58.2)	52.2 (56.3)	54.2 (59.2)	52.5 (62.5)
	KMC-N2	Kingsbury Road, Curdworth CP, Marston	Free-field	56.3 (64.2)	57.0 (59.8)	55.0 (57.5)	54.4 (57.7)	53.5 (58.8)	54.3 (56.7)	54.0 (55.7)	53.1 (54.7)	53.2 (56.0)	52.0 (55.9)	54.2 (56.8)	53.0 (58.6)
MB	MB-N1	Kingsbury Road, Curdworth, Sutton Coldfield	Free-field	57.2 (60.9)	56.5 (59.9)	58.7 (65.1)	57.2 (64.7)	53.7 (59.6)	55.7 (57.3)	56.3 (57.8)	56.5 (57.7)	55.9 (62.2)	50.8 (55.6)	56.3 (62.5)	51.9 (61.1)
FAEU	FAEU-N1	Orchard Cottage, Newlands Lane, Curdworth	Free-field	57.7 (61.5)	58.3 (61.9)	56.2 (62.4)	55.3 (60.5)	54.7 (62.8)	56.2 (58.1)	54.6 (56.7)	53.7 (56.2)	54.3 (57.6)	51.6 (57.9)	55.7 (59.7)	53.5 (61.1)
WOSC	WOSC-N1	53 Watton Lane, Water Orton CP	Free-field	65.7 (67.9)	65.2 (67.5)	64.9 (66.8)	62.9 (65.8)	60.2 (66.6)	62.3 (63.3)	64.2 (64.9)	64.2 (64.8)	63.3 (66.5)	57.0 (60.5)	62.9 (65.2)	58.7 (66.1)
ALO	ALO-N1	47 Attleboro Lane, Water Orton	Free-field	55.1 (58.7)	58.1 (69.4)	53.3 (61.7)	53.1 (59.5)	52.3 (59.8)	53.5 (54.2)	53.2 (57.0)	51.5 (55.3)	53.1 (63.3)	50.1 (54.4)	54.5 (57.1)	52.3 (57.6)
GLD	GLD-N1	10 Gilson Dr, Coleshill, Birmingham	Free-field	59.0 (63.1)	59.1 (63.1)	57.0 (61.5)	56.3 (61.5)	55.4 (68.3)	56.4 (57.3)	58.0 (58.4)	56.6 (59.9)	55.9 (62.4)	52.5 (57.0)	57.6 (72.1)	55.1 (68.7)

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
BRD	BRD-N2	1, New Cottages, Birmingham Road, Coleshill	Free field	62.9 (64.9)	62.0 (64.1)	62.3 (64.8)	61.0 (63.6)	58.6 (64.8)	59.7 (60.5)	60.8 (61.3)	60.9 (61.3)	60.4 (62.9)	56.1 (60.2)	60.7 (63.6)	57.6 (64.5)
CHR	CHR-N1	Coleshill Heath Road, Coleshill Heath, Solihull	Free-field	64.6 (67.1)	65.2 (66.9)	63.4 (66.2)	59.7 (65.2)	57.6 (65.2)	60.9 (61.3)	62.0 (62.8)	62.5 (62.9)	61.8 (64.6)	57.1 (61.3)	61.2 (62.8)	57.6 (64.8)
	CHRU-N1	(east of) 276 Yorkminster Drive, Birmingham	Free-field	61.6 (63.3)	60.9 (64.2)	61.3 (64.3)	61.3 (63.7)	59.0 (64.8)	59.2 (60.0)	61.9 (63.1)	62.4 (62.7)	61.7 (63.1)	57.4 (62.2)	61.1 (65.4)	56.2 (62.3)
PE	PE-N1	Common Farm, Chester Road, Coleshill	Free-field	56.8 (61.1)	57.8 (61.3)	55.8 (59.8)	55.9 (59.8)	54.1 (60.8)	55.7 (57.0)	55.4 (57.2)	54.6 (57.2)	54.8 (57.3)	52.2 (56.9)	55.8 (59.8)	52.8 (61.1)
BIC	BIC-N1	Park Farm Barns, Chester Rd, Marston Green	Free-field	56.8 (61.7)	55.7 (59.2)	53.8 (58.2)	53.3 (57.7)	52.3 (62.2)	54.7 (56.7)	51.3 (51.9)	52.0 (53.9)	51.1 (53.3)	49.2 (54.4)	52.9 (56.7)	51.2 (58.1)
DLE	DLE-N1	Hampton Hill Hounds, Nursery Cottage, Coventry Road	Free-field	55.4 (59.2)	54.7 (59.4)	53.7 (59.9)	52.8 (57.5)	51.2 (58.3)	54.9 (59.6)	53.0 (54.5)	52.8 (54.8)	52.9 (56.2)	50.3 (56.4)	51.5 (57.1)	48.2 (58.5)

2.1.2 Table 4 presents a summary of the measured vibration levels at the 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
MB - Marston Box	MB-V1	Kingsbury Road, Curdworth, Sutton Coldfield, West Midland, B76 0DF	3.37 (X-axis)
WOSC - Water Orton South Compound	WOSC-V1	53 Watton Lane, Water Orton CP, Warwickshire	1.35 (X-axis)
ALO - Attleboro Lane Overbridge	ALO-V1	47 Attleboro Lane, Water Orton, Birmingham	5.04 (X-axis)
BRD - Birmingham Road	BRD-V1	1, New Cottages, Birmingham Road, Coleshill, Birmingham B46 1DP	0.76 (X-axis)
FAEU - Orchard Cottage	FAEU-V1	Orchard Cottage, Newlands Lane, Curdworth, Warwickshire, B76 0BE	3.24 (X-axis)
GLD – Gilson Drive	GLD-V1	10 Gilson Dr, Coleshill, Birmingham B46 1DN	1.55 (X-axis)
CHR - Coleshill Heath Road	CHRU-V1	(east of) 276 Yorkminster Drive, Birmingham, B37 6TB	1.66 (X-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 LOAEL and SOAEL

2.2.1 The lowest observed adverse effect level (LOAEL) is defined in the Planning Practice Guidance – Noise (PPG) as the level above which "noise starts to cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life".

2.2.2 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."

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

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

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

Table 5: Summary of Exceedances of LOAEL and SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
KMC	KMC-N1*	Wheatley House, Kingsbury Road, Sutton Coldfield	All days	All periods	No exceedances	No exceedances
	KMC-N2	Wheatley House, Kingsbury Road, Sutton Coldfield	All days	All periods	No exceedances	No exceedances
MB	MB-N1*	Kingsbury Road, Curdworth	All days	All periods	No exceedances	No exceedances
FAEU	FAEU-N1	Orchard Cottage, Newlands Lane, Curdworth	All days	All periods	No exceedances	No exceedances
WOSC	WOSC-N1	53 Watton Lane, Water	All days	All periods	No exceedances	No exceedances

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
		Orton CP, Warwickshire				
ALO	ALO-N1	47 Attleboro Lane, Water Orton, Birmingham	All days	All periods	No exceedances	No exceedances
BRD	BRD-N2	New Cottages, Birmingham Road, Coleshill, Birmingham B46 1DP	All days	All periods	No exceedances	No exceedances
PE	PE-N1	Common Farm, Chester Road, Coleshill	All days	All periods	No exceedances	No exceedances
BIC	BIC-N1	Park Farm Barns, Chester Rd, Marston Green	All days	All periods	No exceedances	No exceedances
DLE	DLE-N1	Hampton Hill Hounds, Nursery Cottage, Coventry Road	All days	All periods	No exceedances	No exceedances
CHR	CHR-N1	Coleshill Heath Road, Coleshill Heath, Solihull	All days	All periods	No exceedances	No exceedances
	CHRU-N1	(east of) 276 Yorkminster Drive, Birmingham, B37 6TB	All days	All periods	No exceedances	No exceedances
GLD	GLD-N1	Gilson Dr, Coleshill, Birmingham	All days	All periods	No exceedances	No exceedances

* A distance correction has been applied when calculating exceedances of the LOAEL and SOAEL.

2.2.6 No exceedances of the LOAEL and SOAEL were recorded due to HS2 construction works during September 2022

2.3 Exceedances of Trigger Level

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

Table 6: Summary of Exceedances of Trigger Levels

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

2.4 Complaints

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

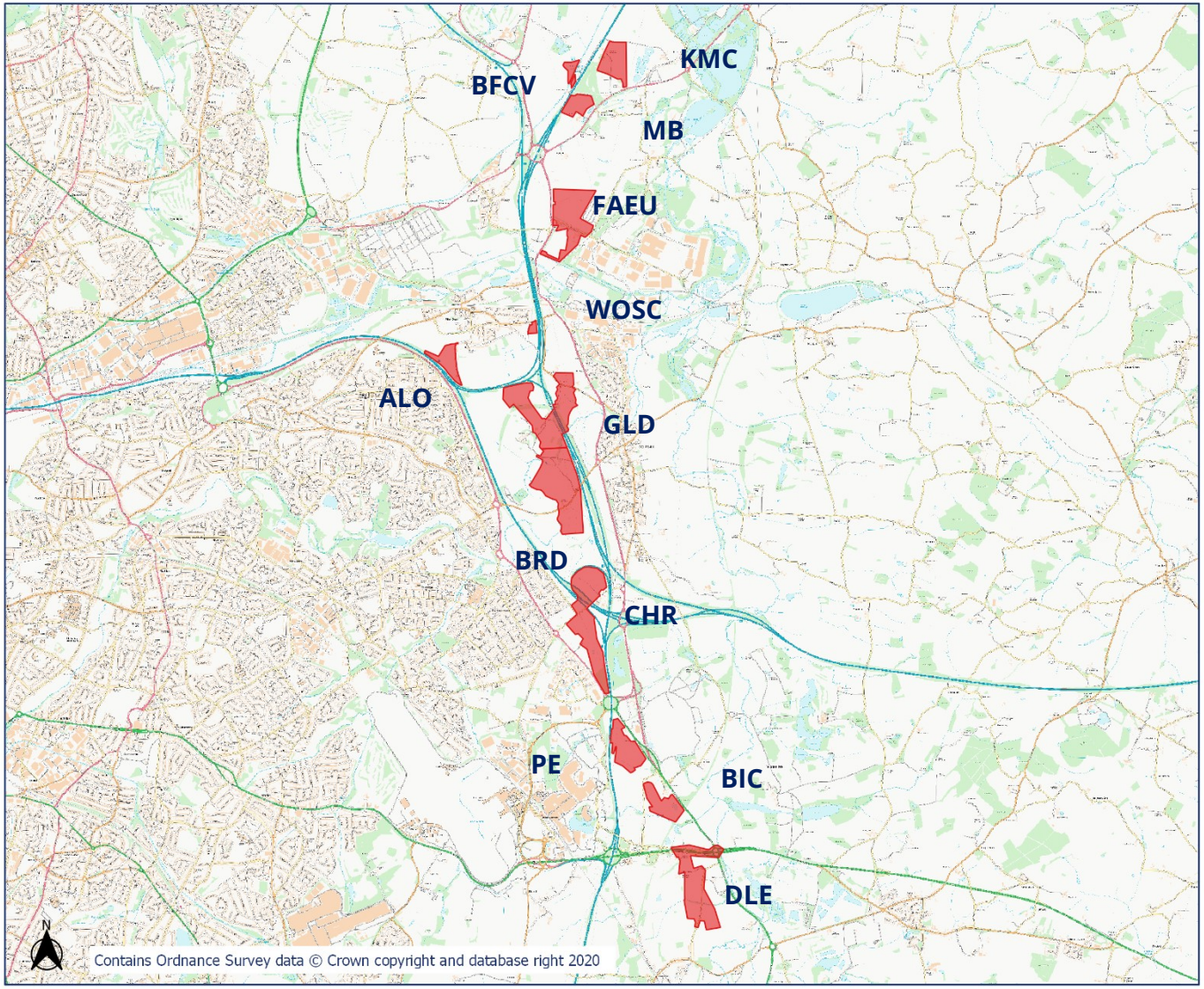
Table 7: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-43950-C	ALO	Complaint due to high levels of vibration felt inside the property.	Meeting was arranged with the stakeholder on 21/09/2022 for the on-going investigation.	The complaint remains open for detailed review of the situation.
HS2-22-82384-E-C	GLD	Complaint due to high levels of vibration felt inside the house.	Investigation showed that the vibrator monitors did not show exceedance.	The investigation results have been shared with the stakeholder and a meeting offered to them.
HS2-22-43975-C	ALO	Complaint due to excessive level of vibrations felt inside the house.	Meeting was arranged with the stakeholder on 18/10/2022 for the on-going investigation.	The complaint remains open for detailed review of the situation.
HS2-22-43991-C	WOSC / ALO	Complaint due to noise at night-time the from site.	Investigation showed that noise disturbance was caused due to some 24-hour works undertaken. However, no exceedance was recorded.	The investigation results have been shared with the stakeholder and a meeting offered to them.

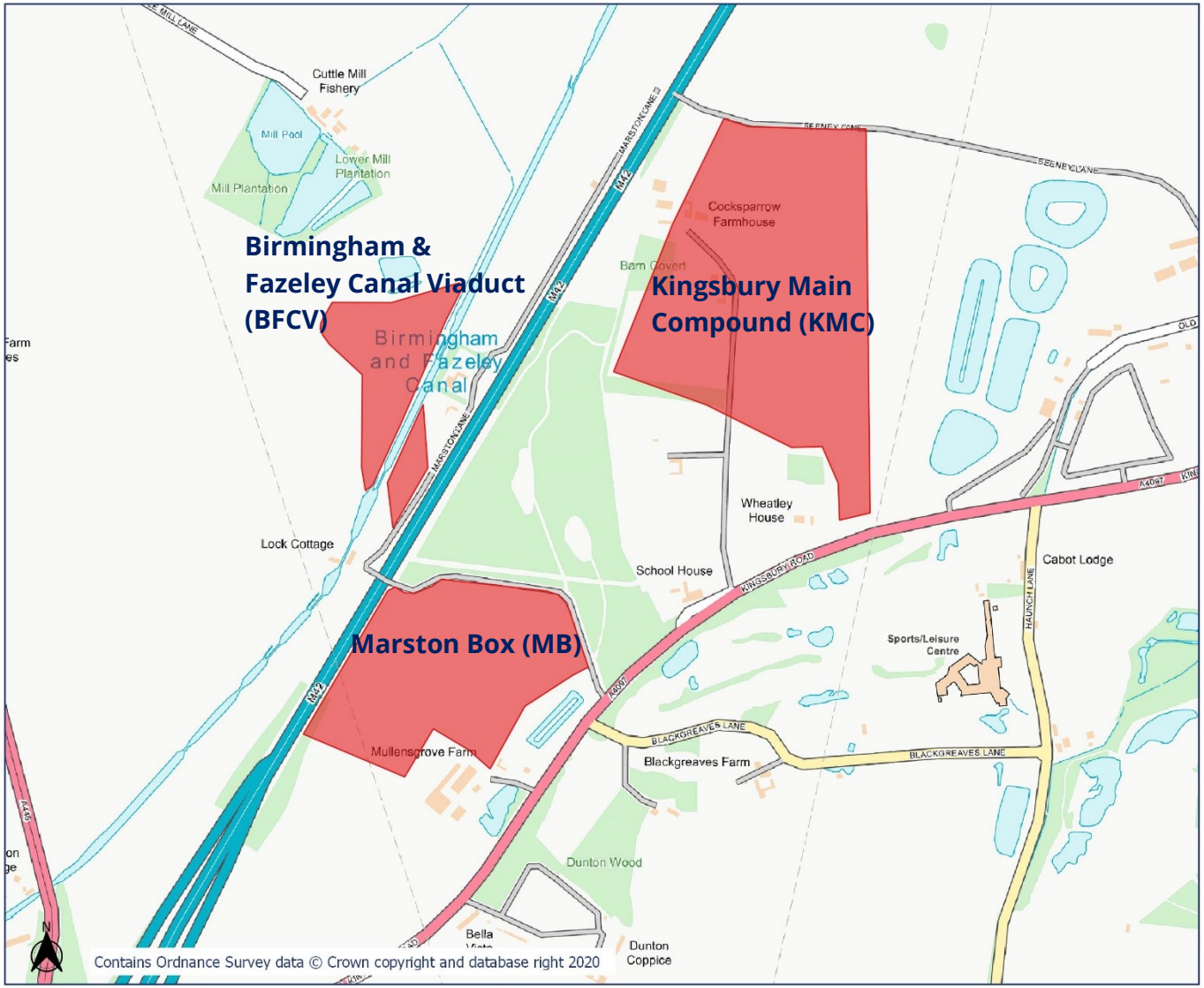
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-43999-C	ALO	Complaint due to high vibration levels.	Investigation on-going.	Meeting being arranged with the stakeholder and contractor for on-going investigation.

Appendix A Site Locations

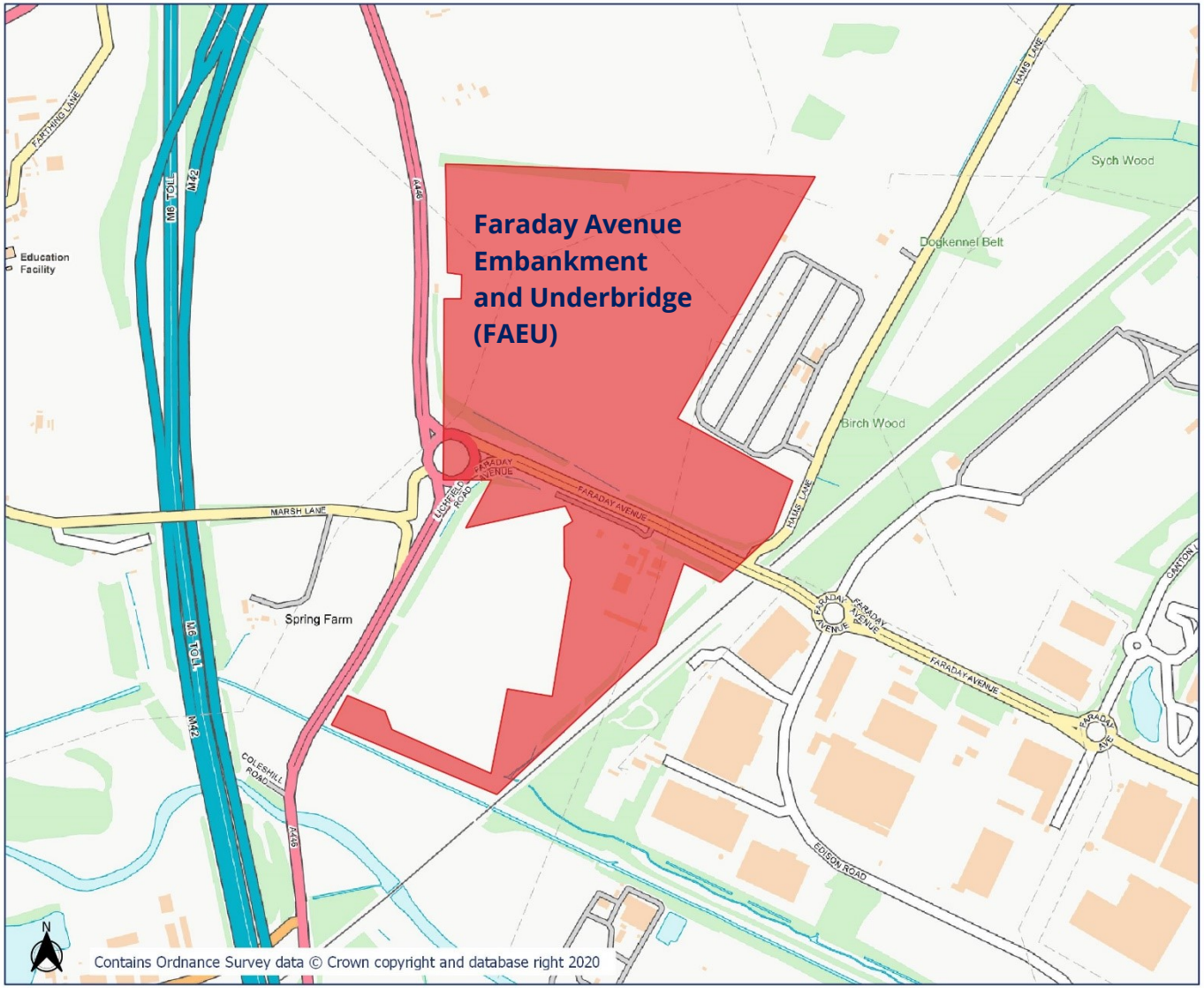
HS2 Worksite Identification Plan - Overview



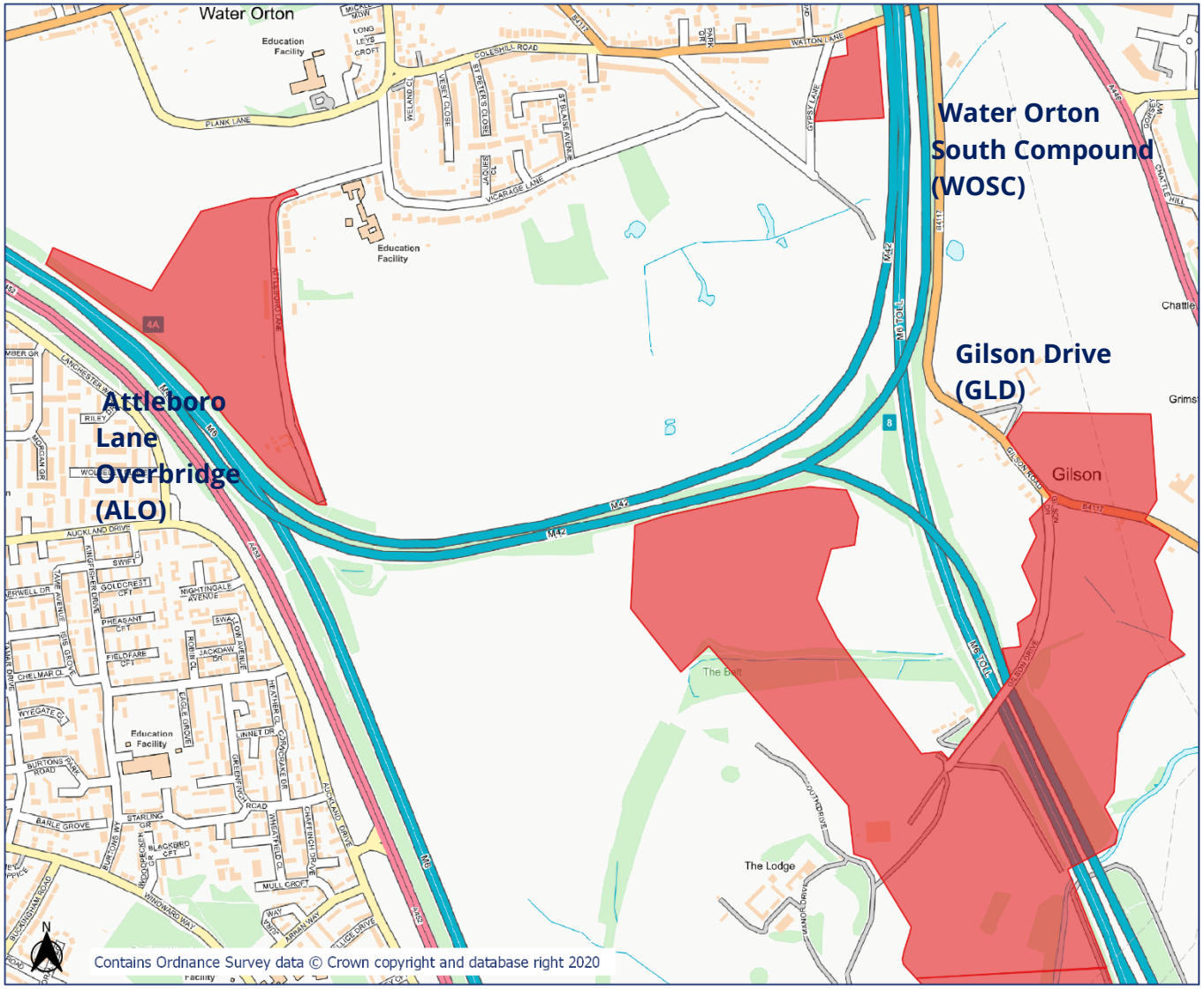
Worksite Identification Plan - 1



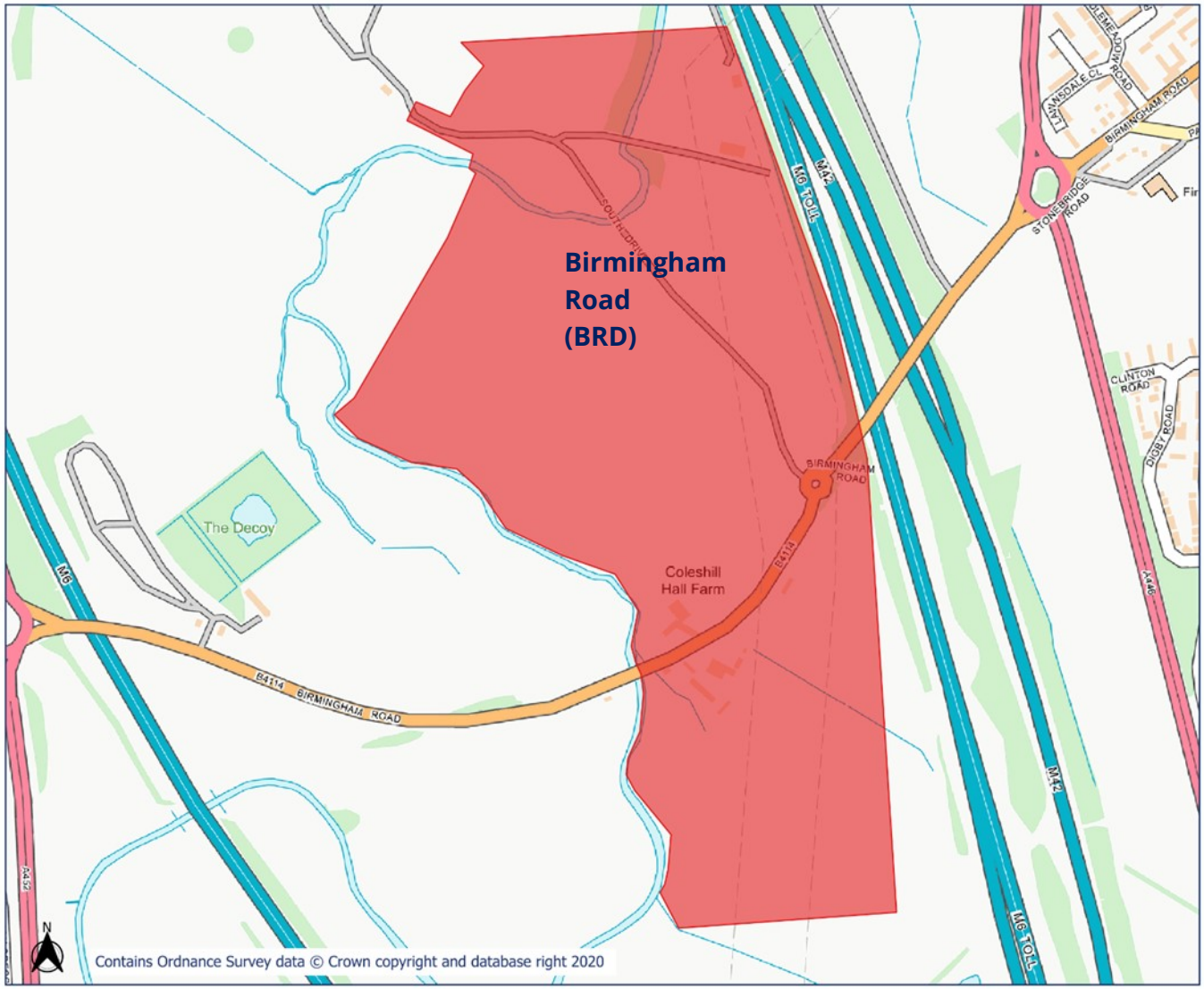
Worksite Identification Plan - 2



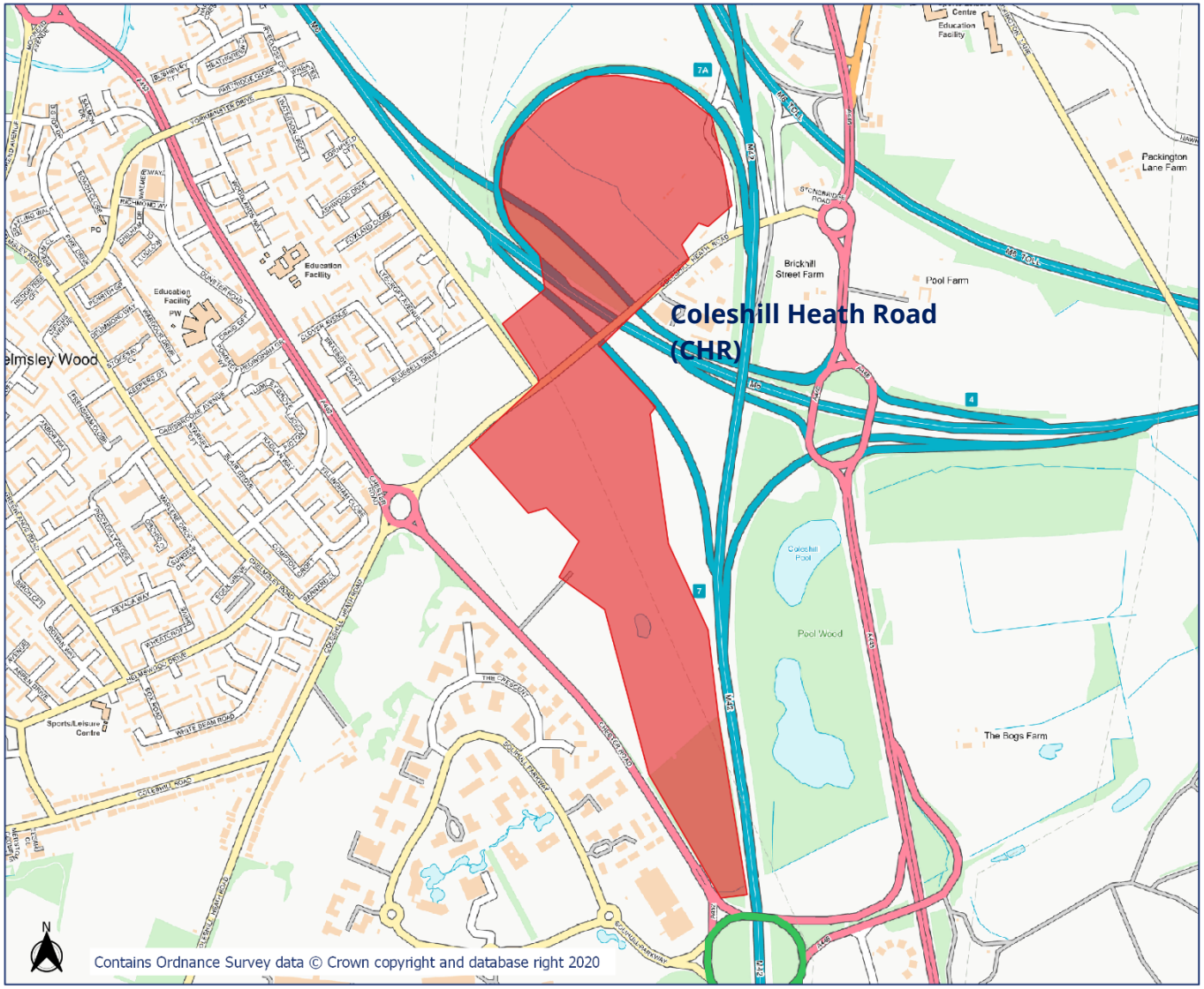
Worksite Identification Plan - 3



HS2 Worksite Identification Plan - 4



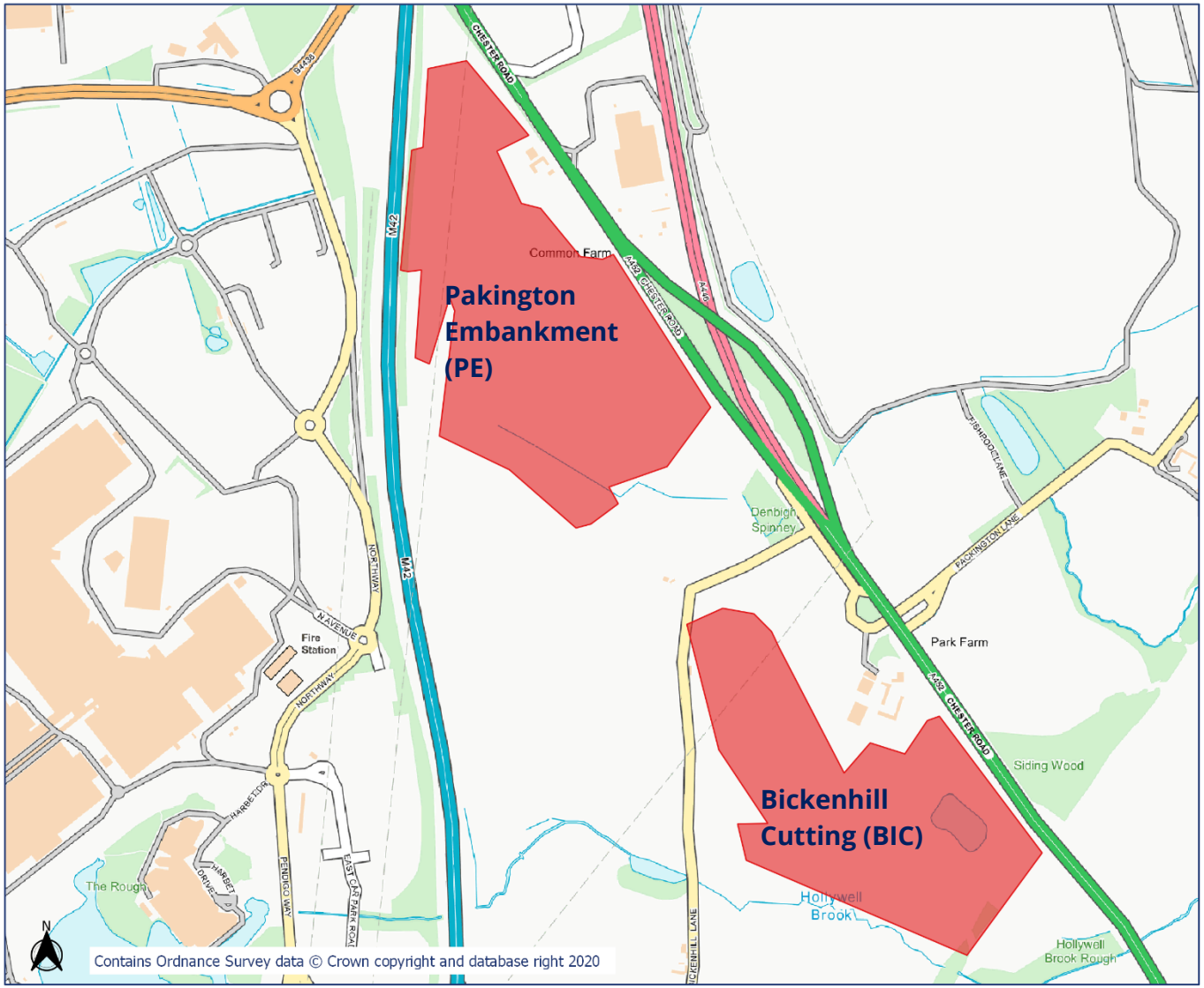
Worksite Identification Plan - 5



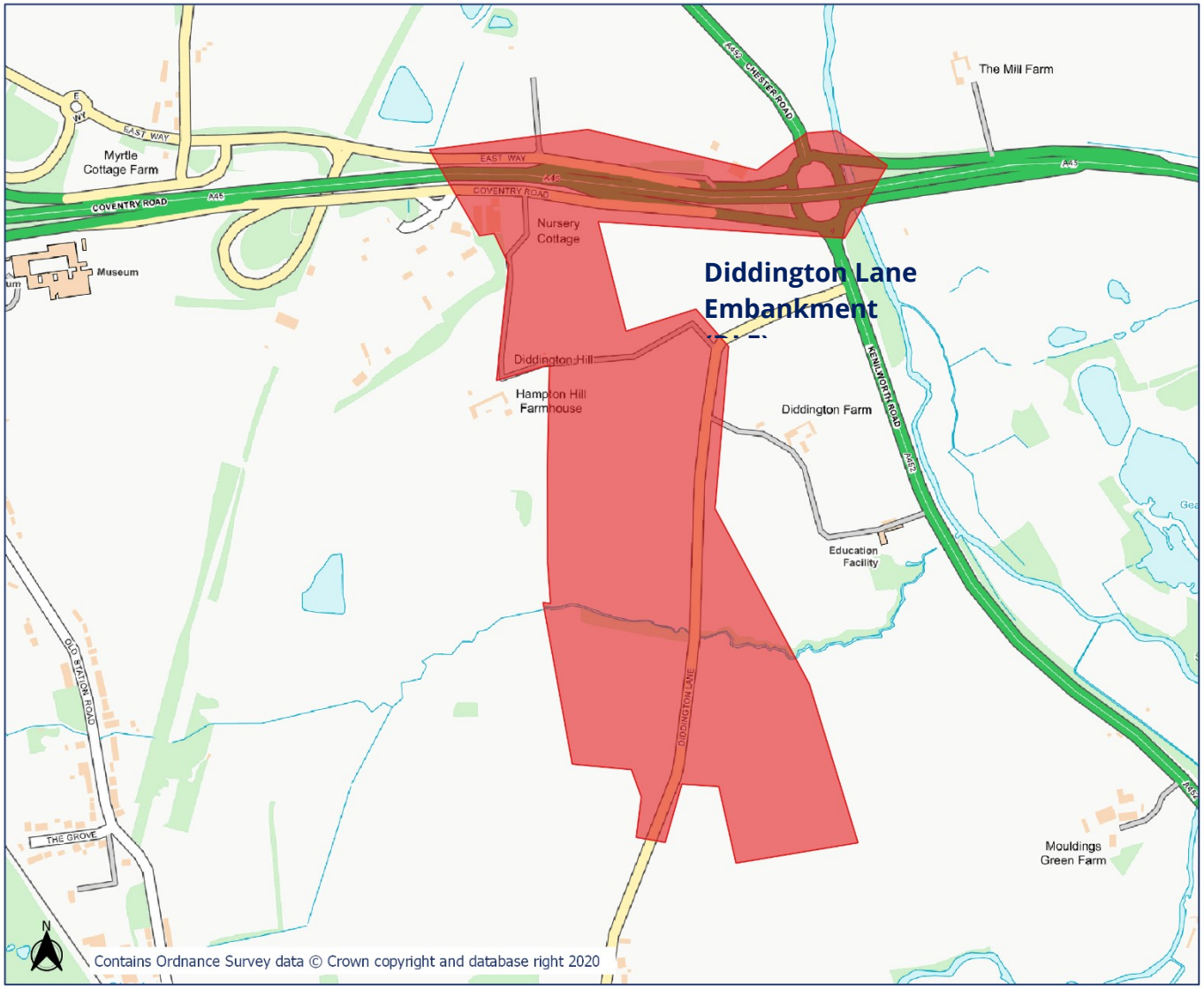
Legend

Active Worksites

Worksite Identification Plan - 6



Worksite Identification Plan - 7

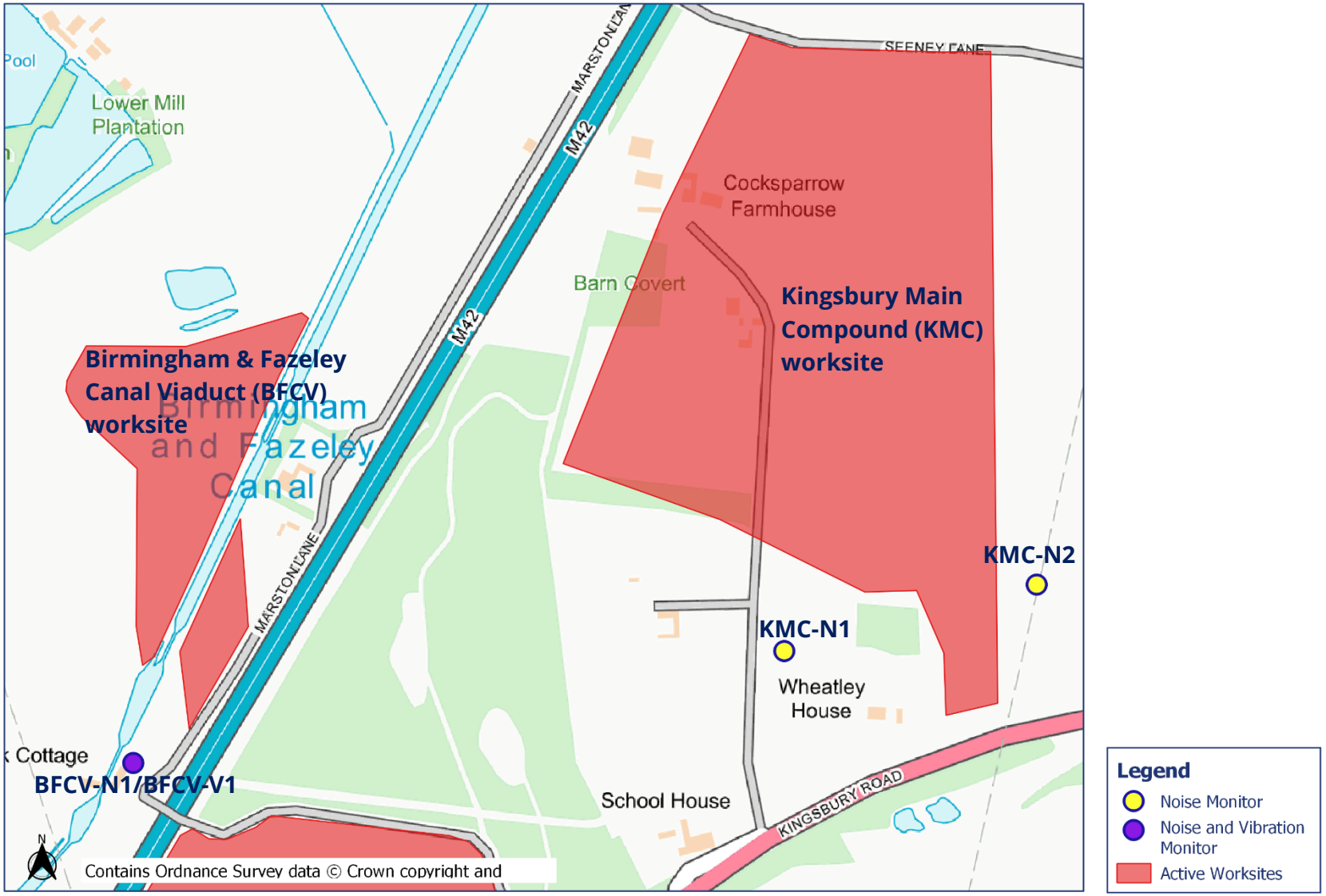


Legend

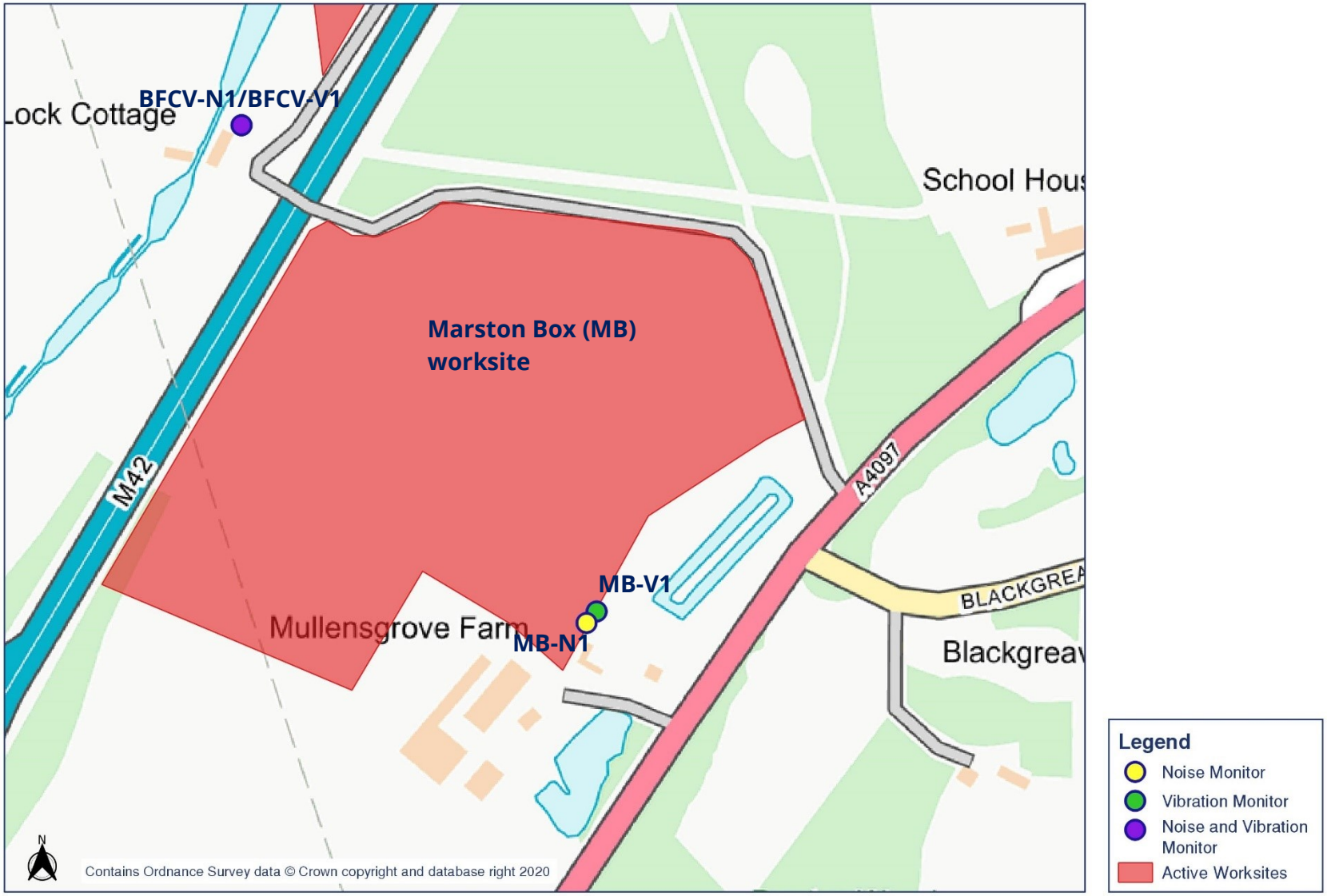
Active Worksites

Appendix B Monitoring Locations

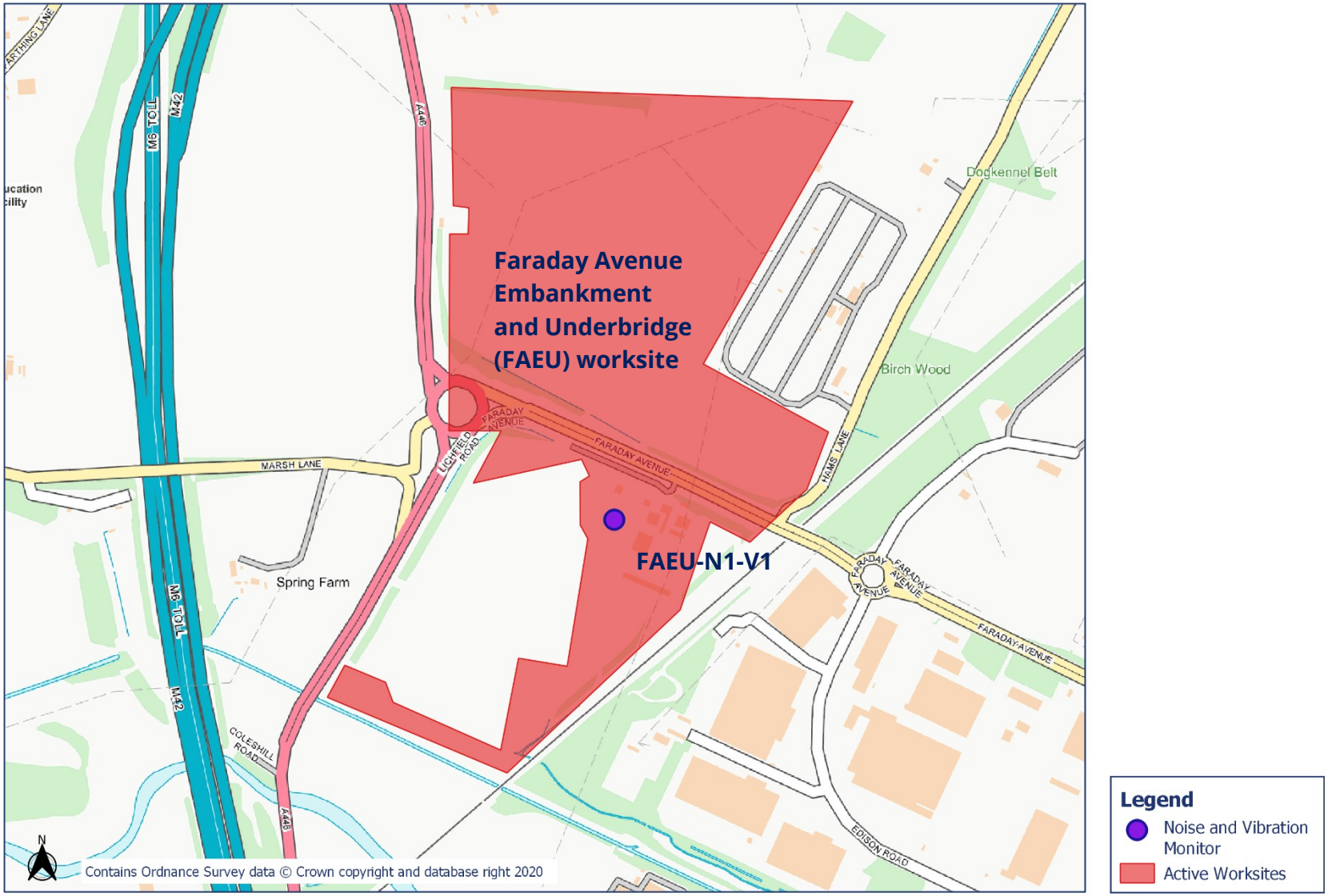
Noise and Vibration Monitoring Plan - 1



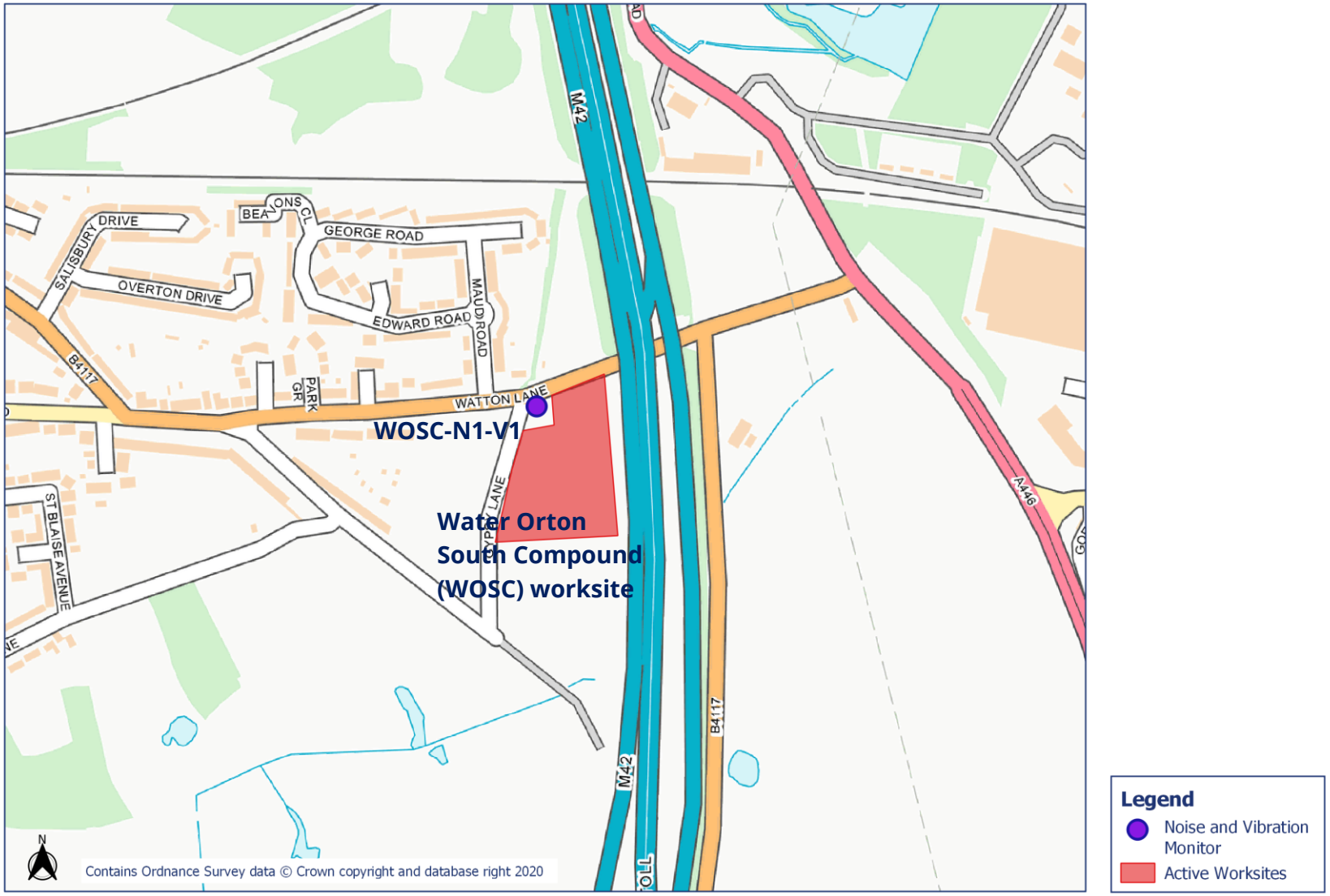
HS2 Noise and Vibration Monitoring Plan - 2



Noise and Vibration Monitoring Plan - 3

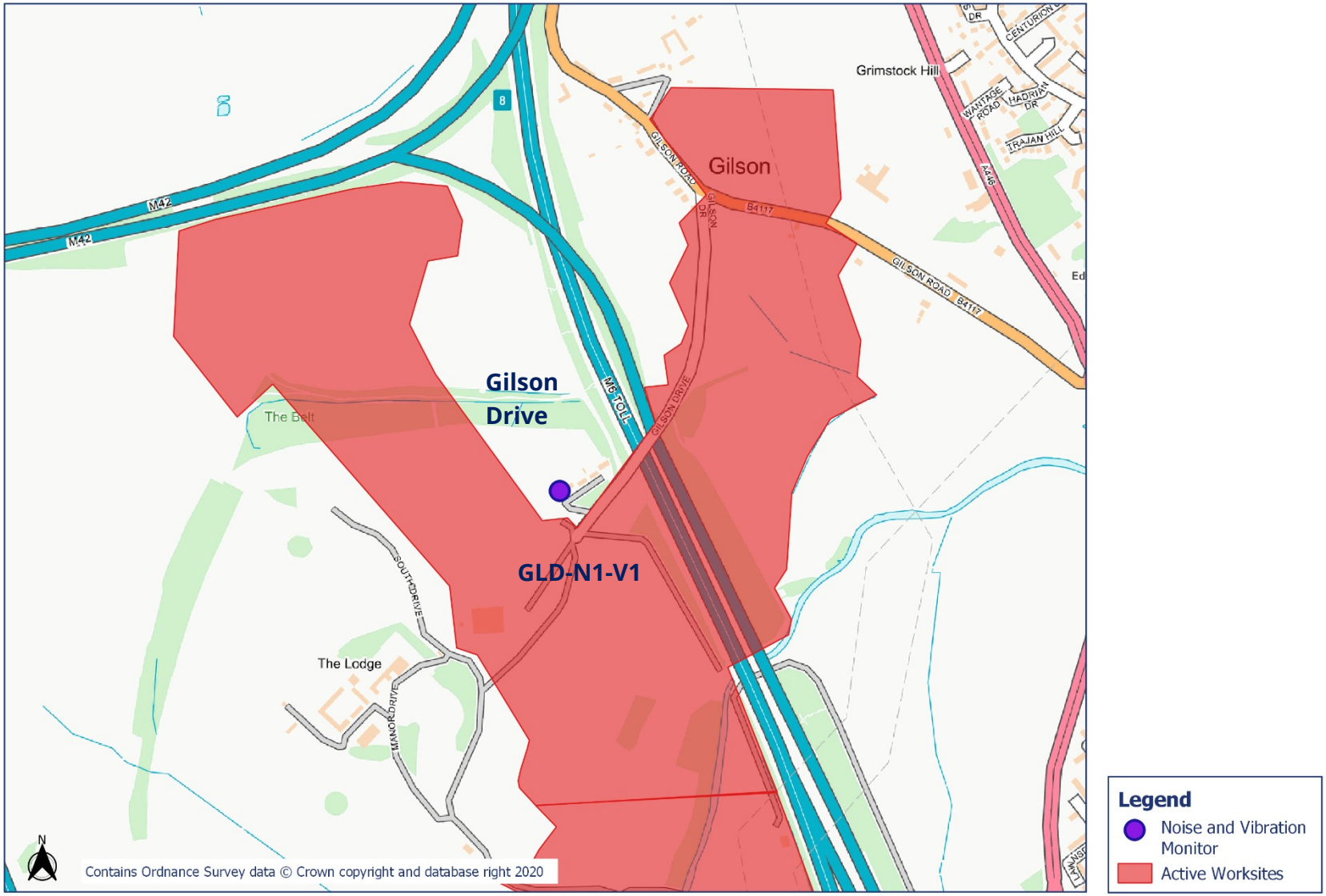


Noise and Vibration Monitoring Plan - 4

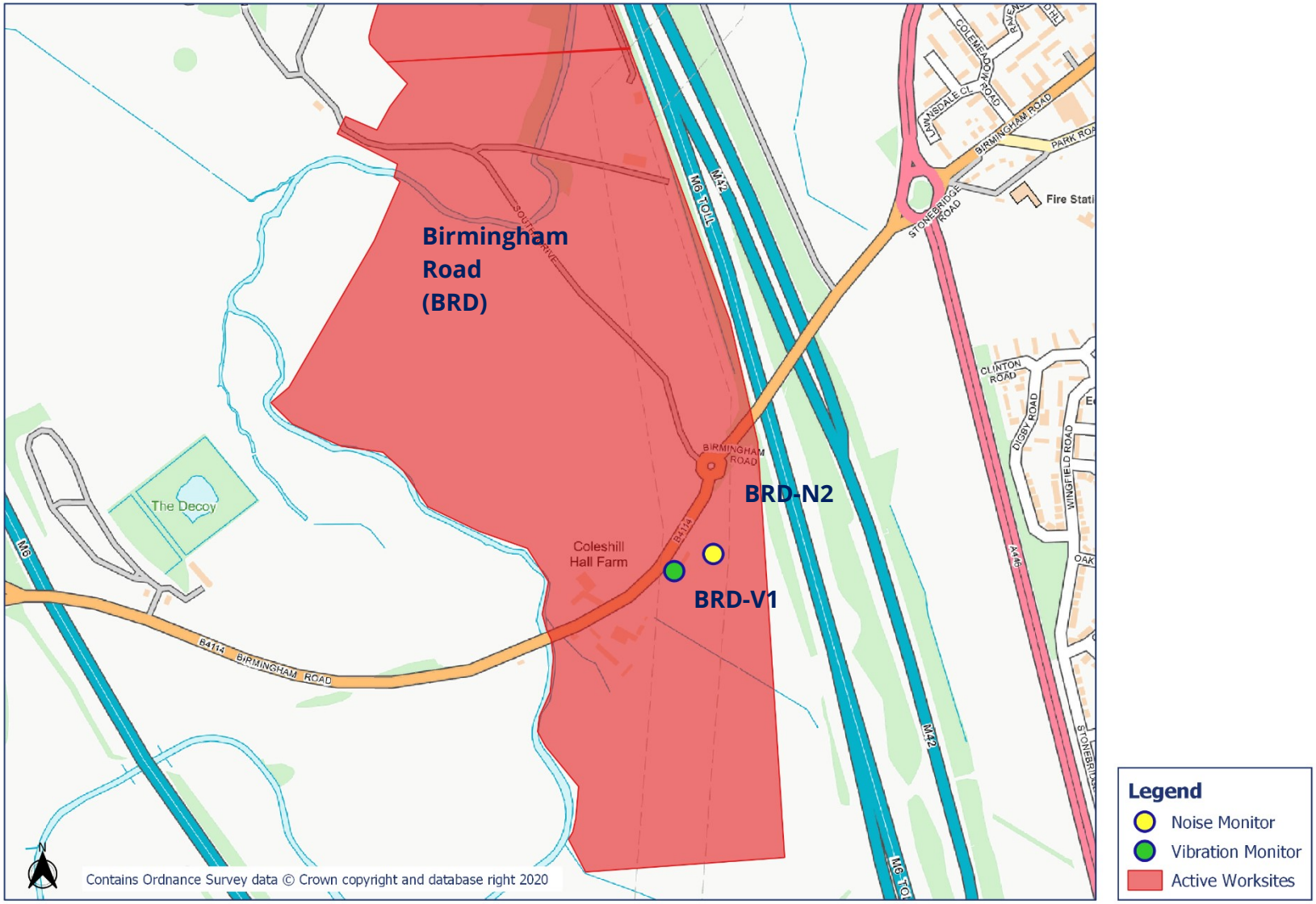


HS2 Noise and Vibration Monitoring Plan - 5

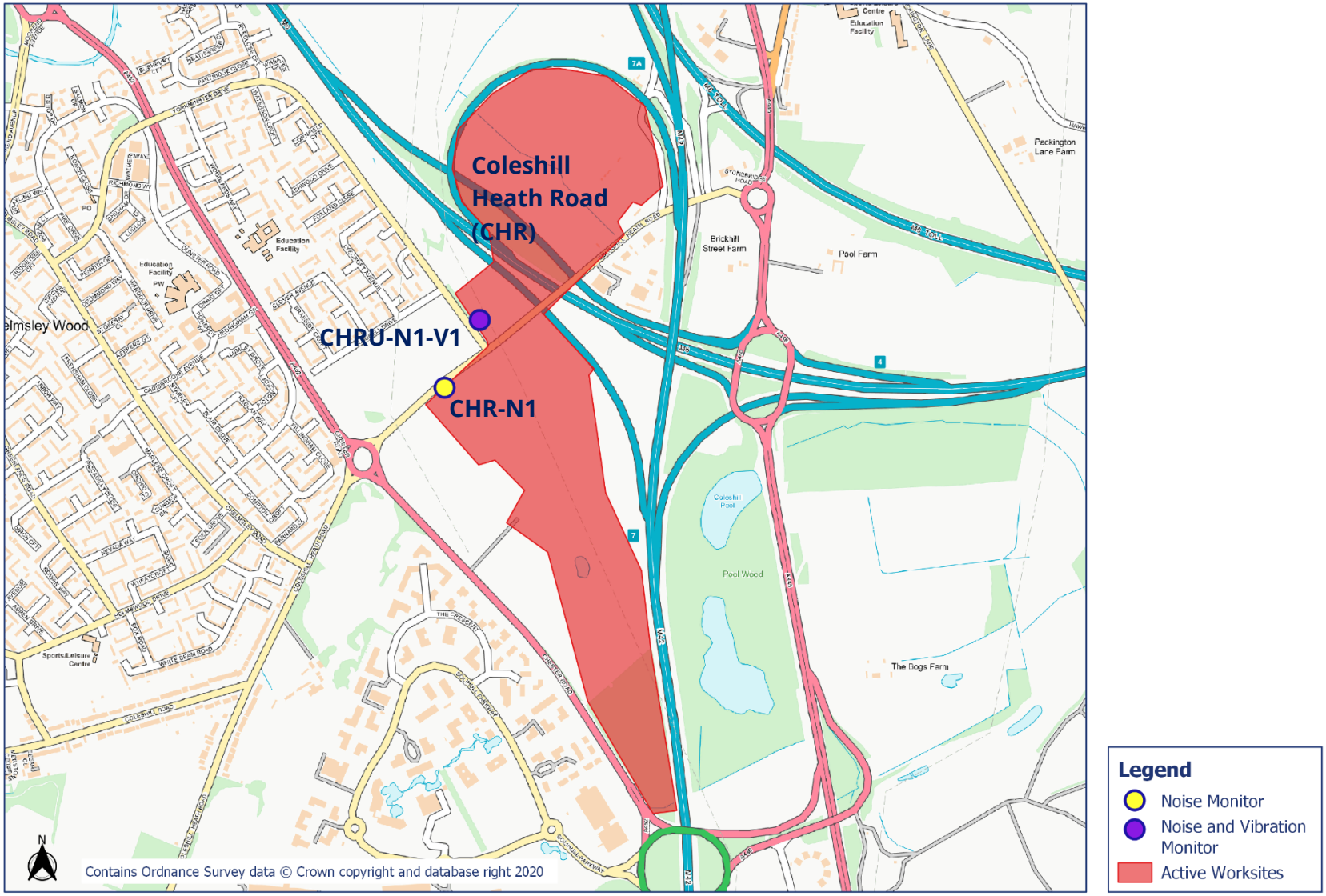
HS2 Noise and Vibration Monitoring Plan - 6



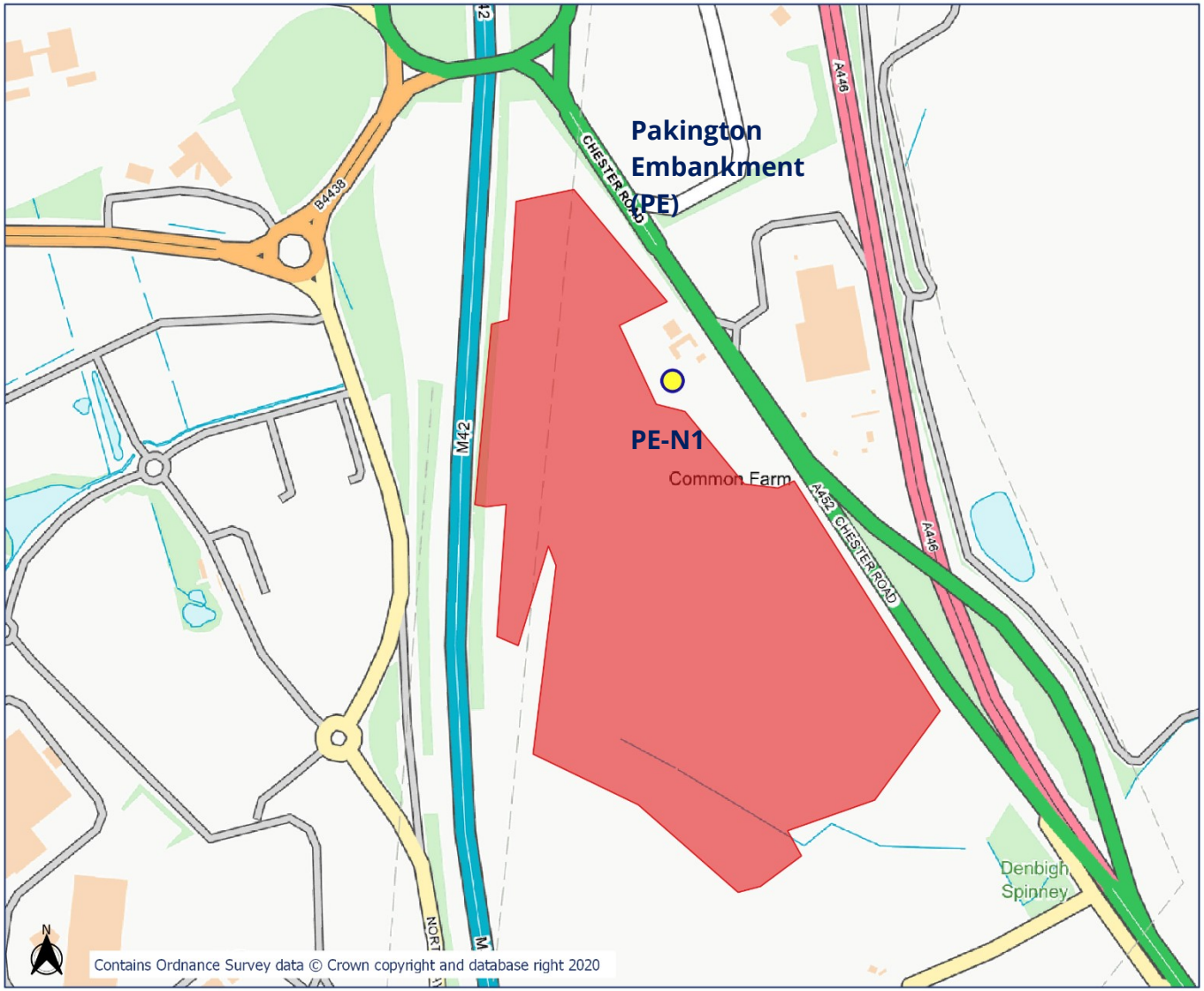
Noise and Vibration Monitoring Plan - 7



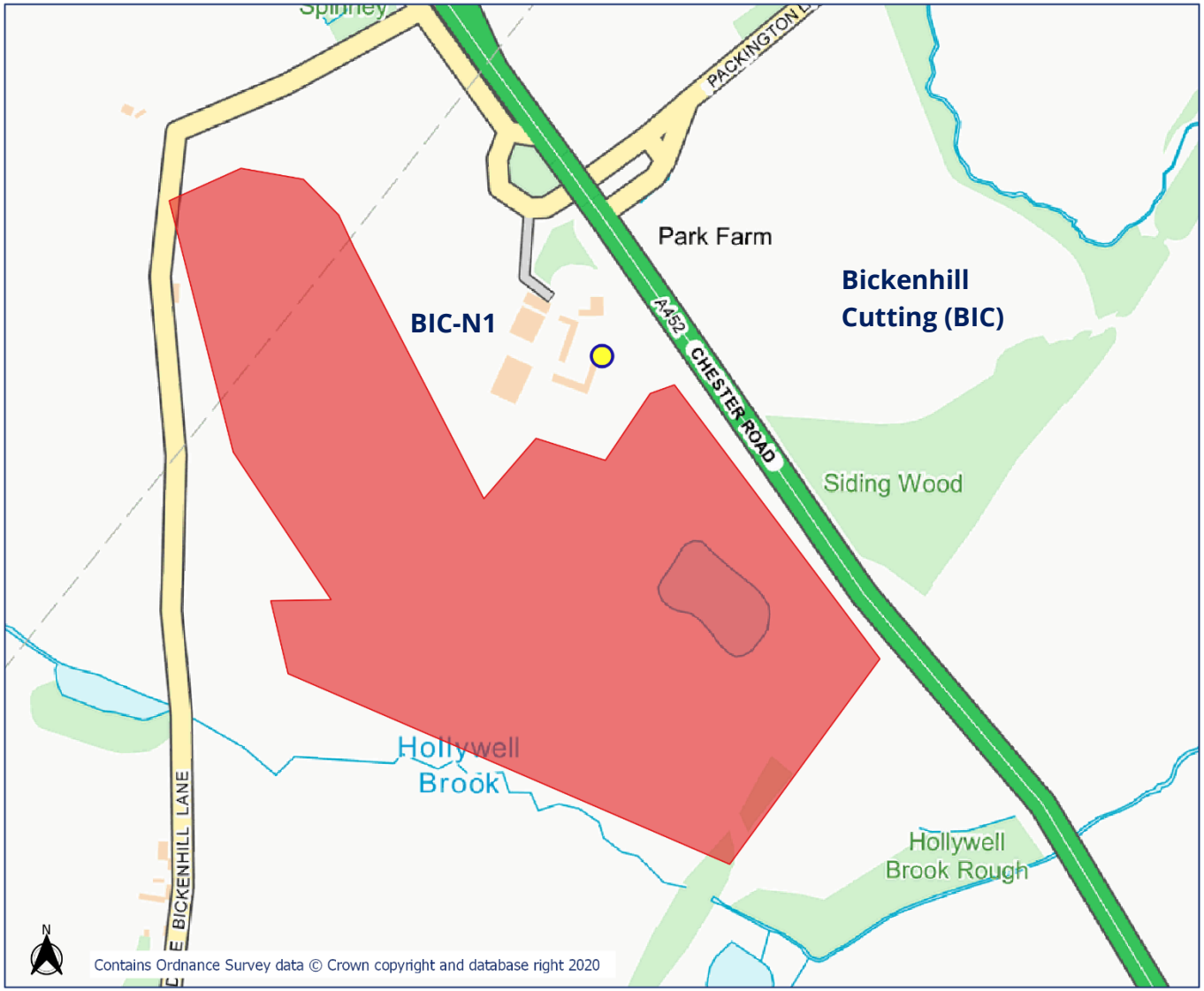
Noise and Vibration Monitoring Plan - 8



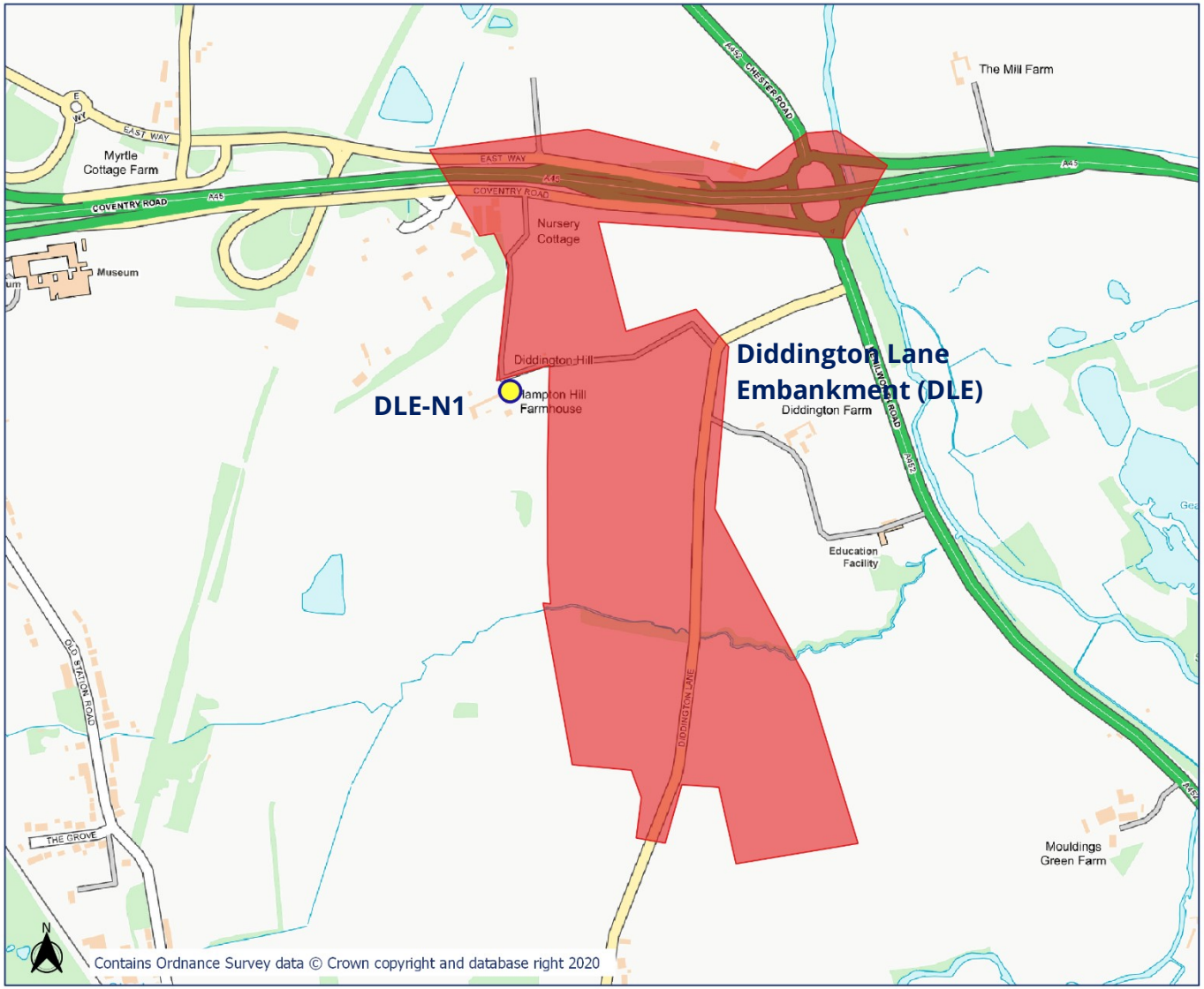
Noise and Vibration Monitoring Plan - 9



HS2 Noise and Vibration Monitoring Plan - 10



Noise and Vibration Monitoring Plan - 11

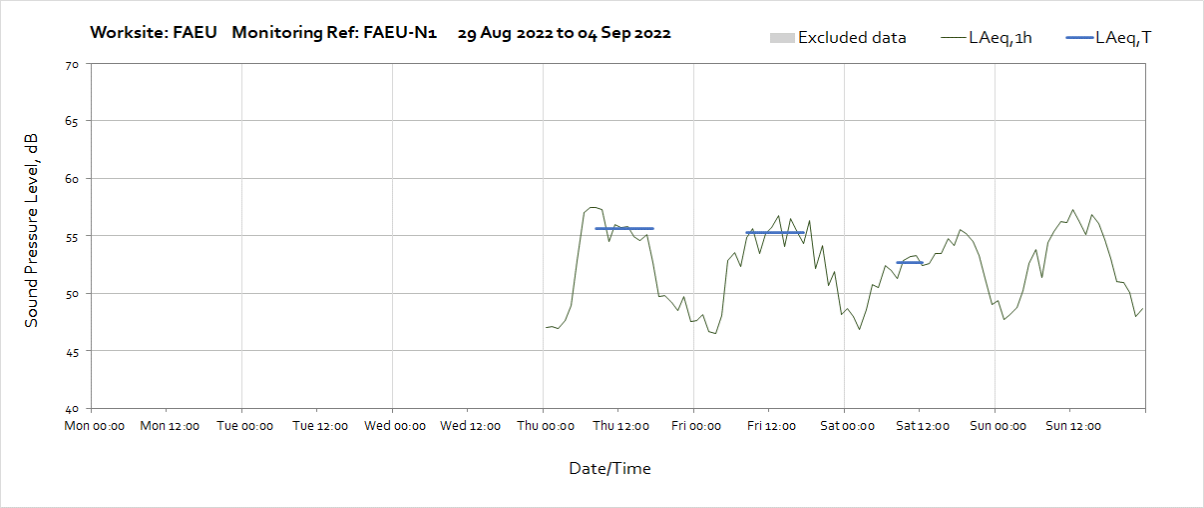


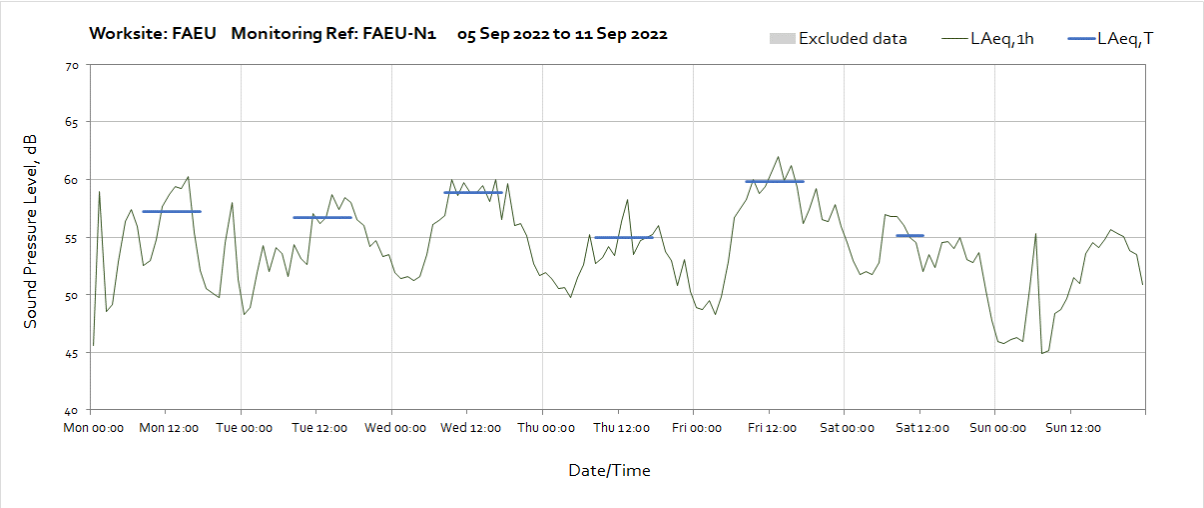
Appendix C Data

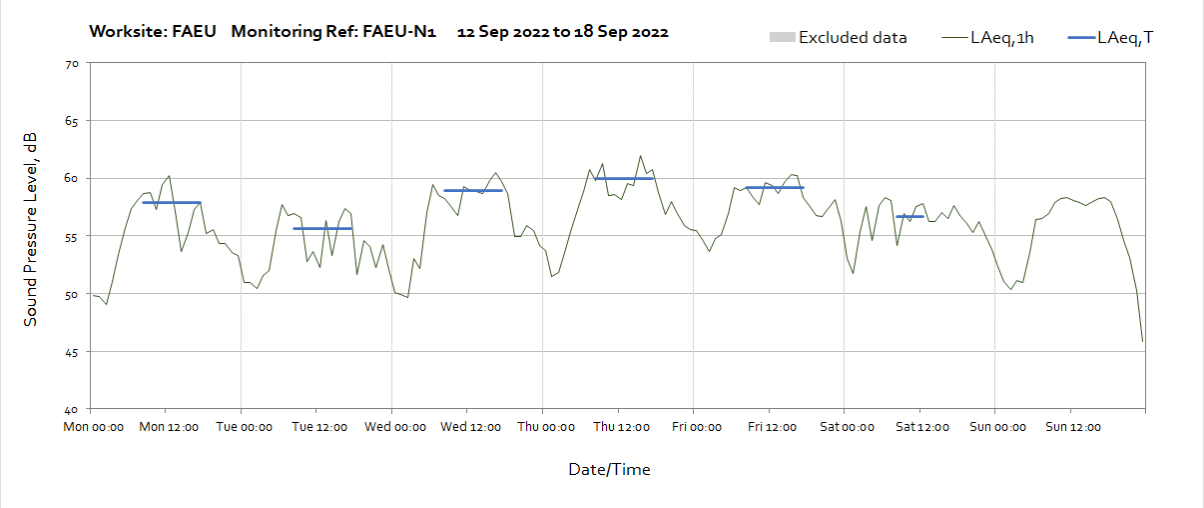
Noise

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: FAEU – Monitoring Ref: FAEU-N1



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LAeq,T
Sound Pressure Level, dB
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Tue 00:00
Tue 12:00
Wed 00:00
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Sat 12:00
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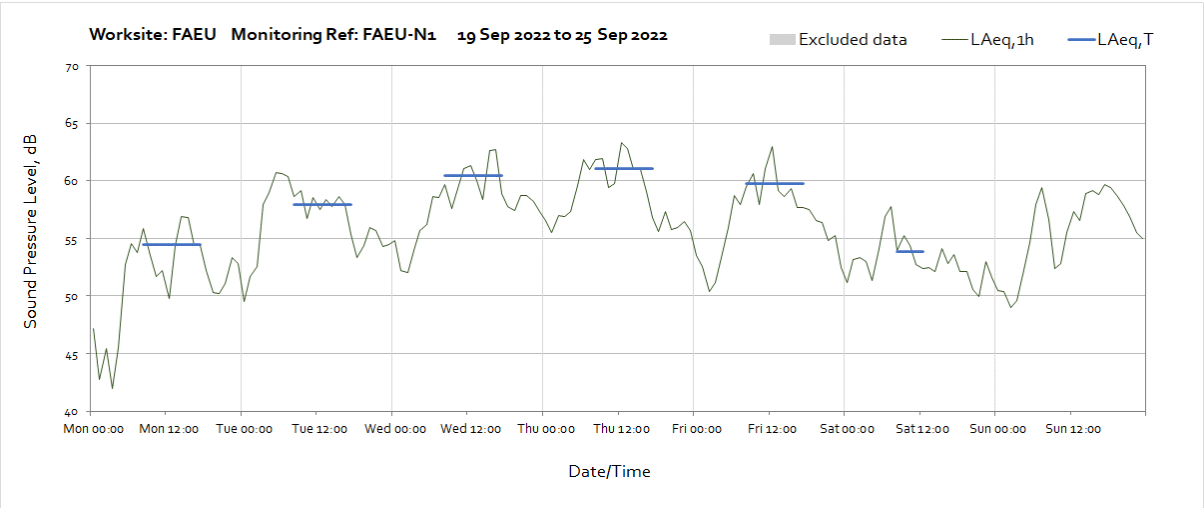
Date/Time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Excluded data
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LAeq,T
Sound Pressure Level, dB
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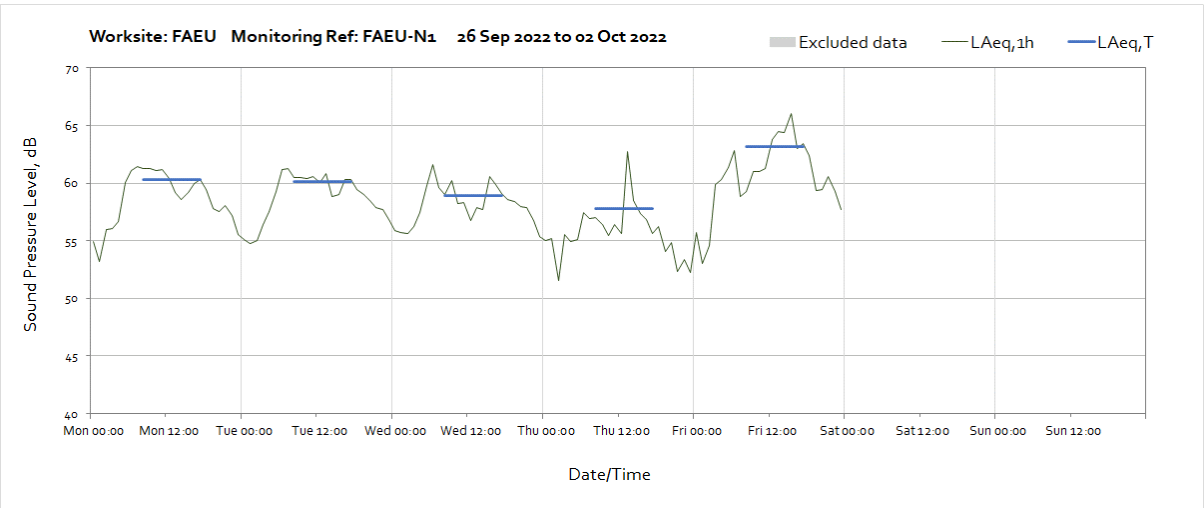
Date/Time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Sound Pressure Level, dB
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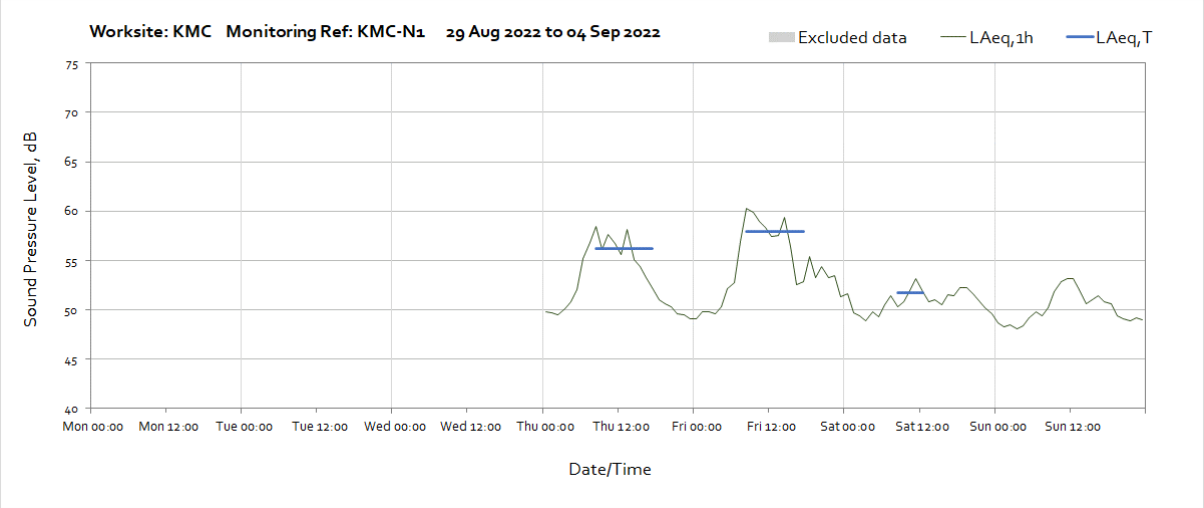
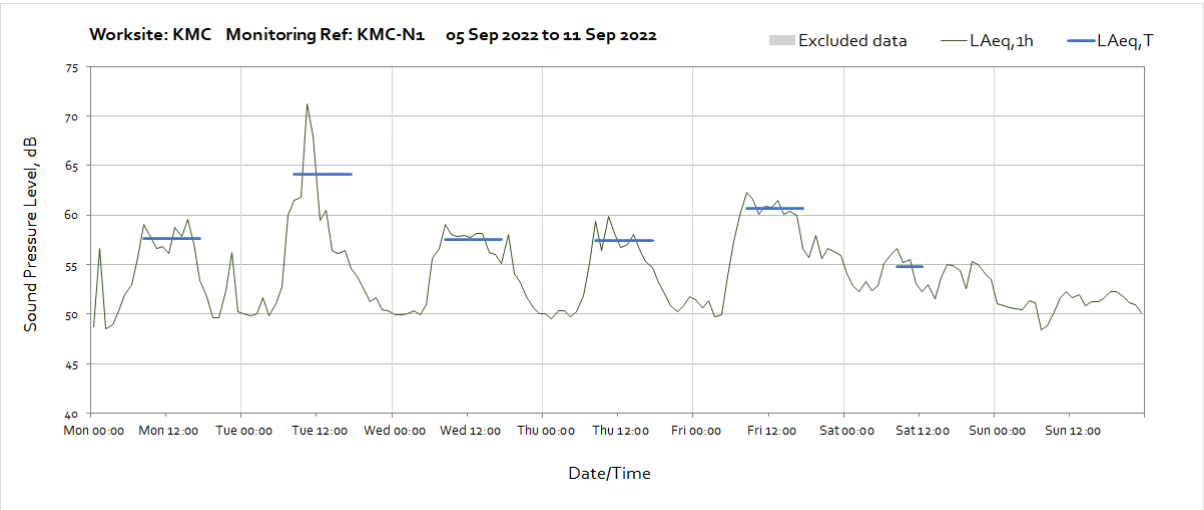
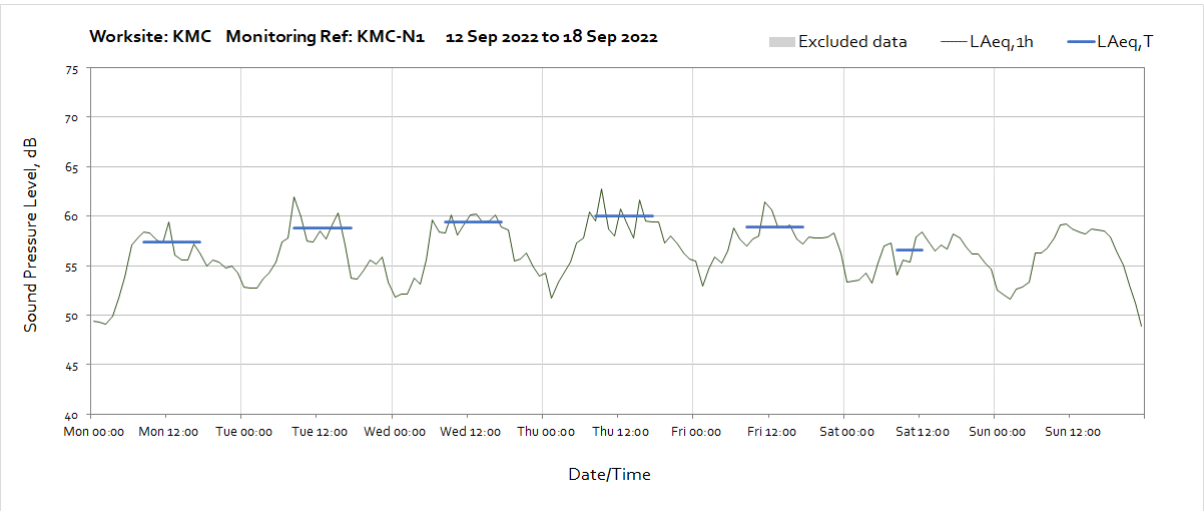
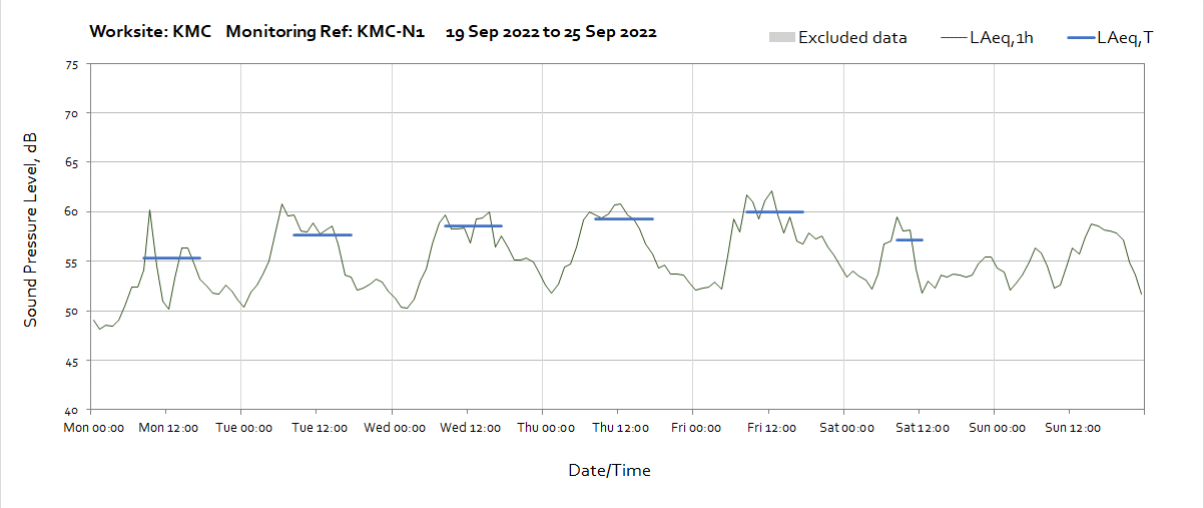
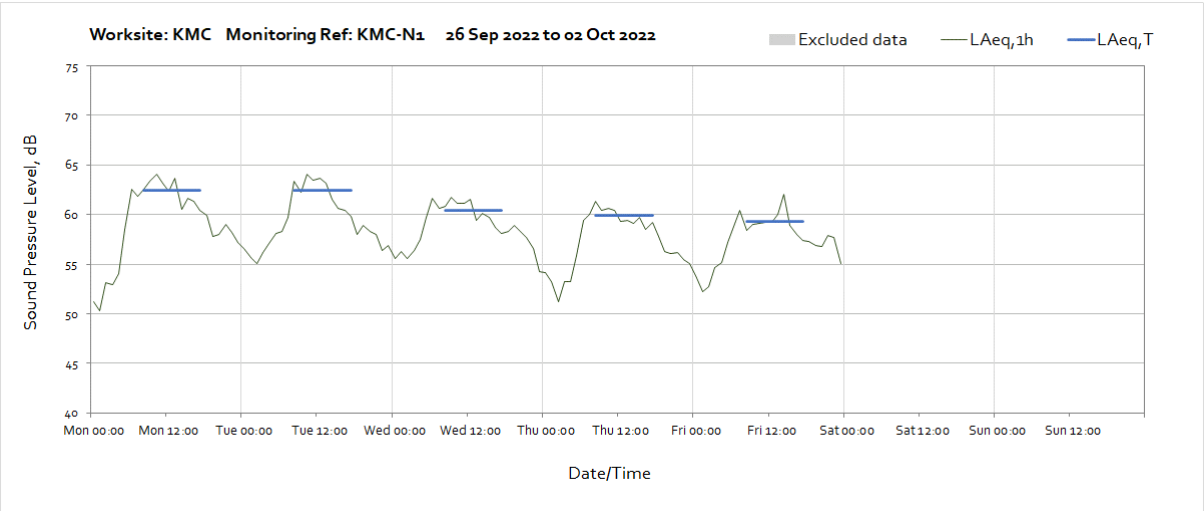
Worksite: KMC – Monitoring Ref: KMC-N1











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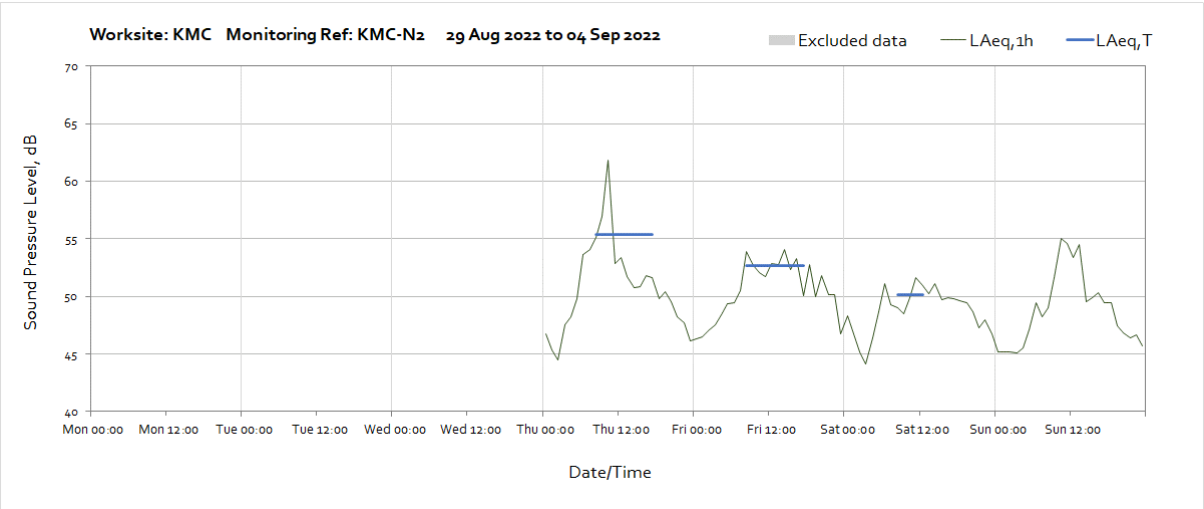

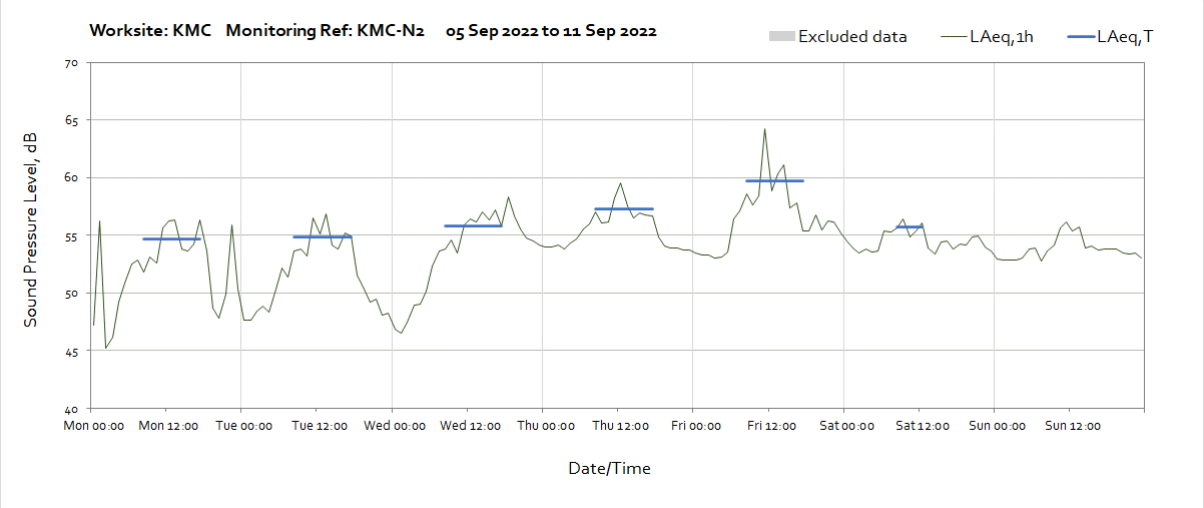
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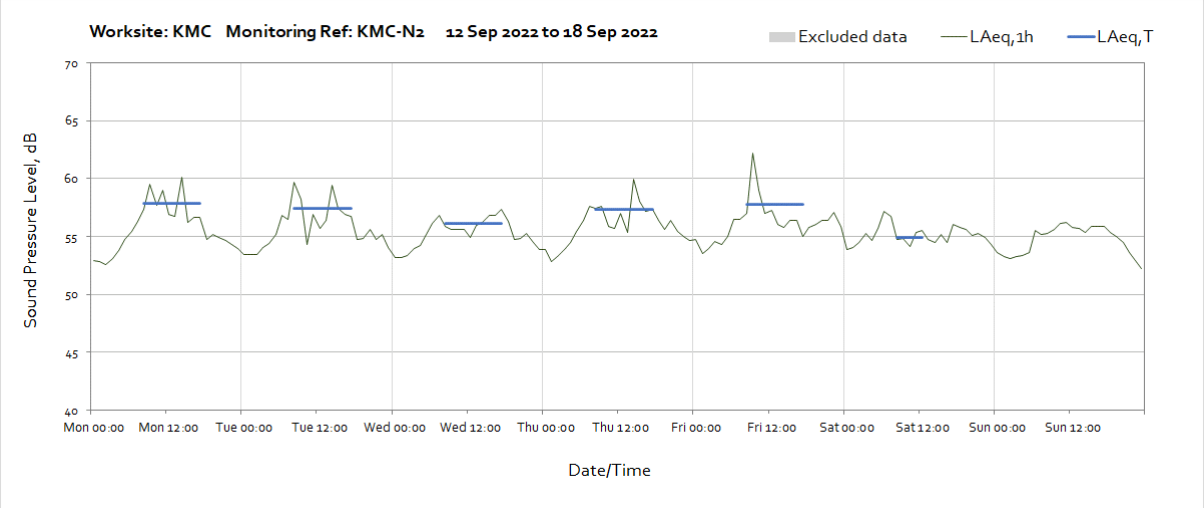
Date/Time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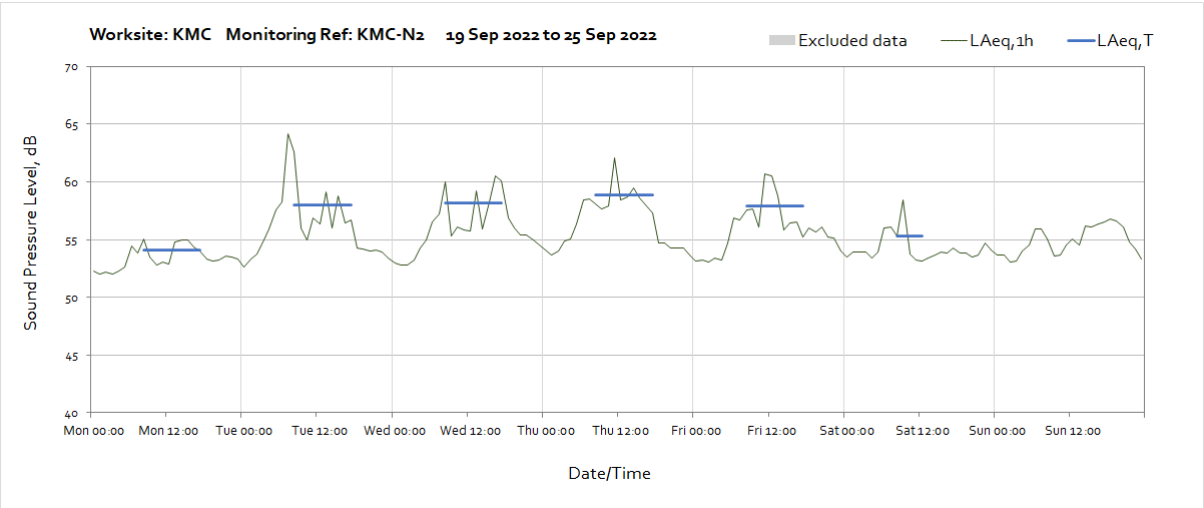
Date/Time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LAeq,T
Sound Pressure Level, dB
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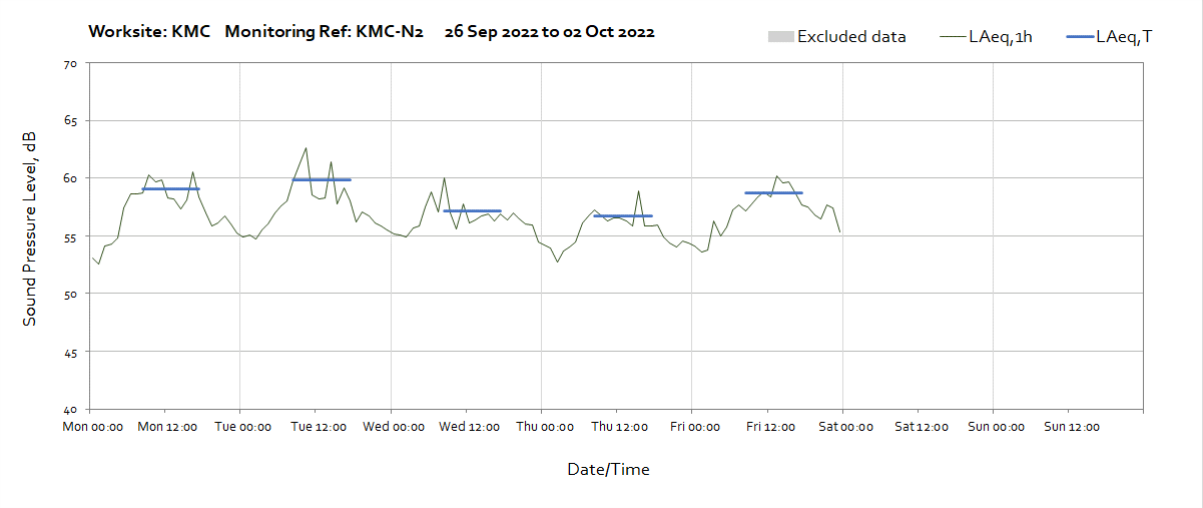

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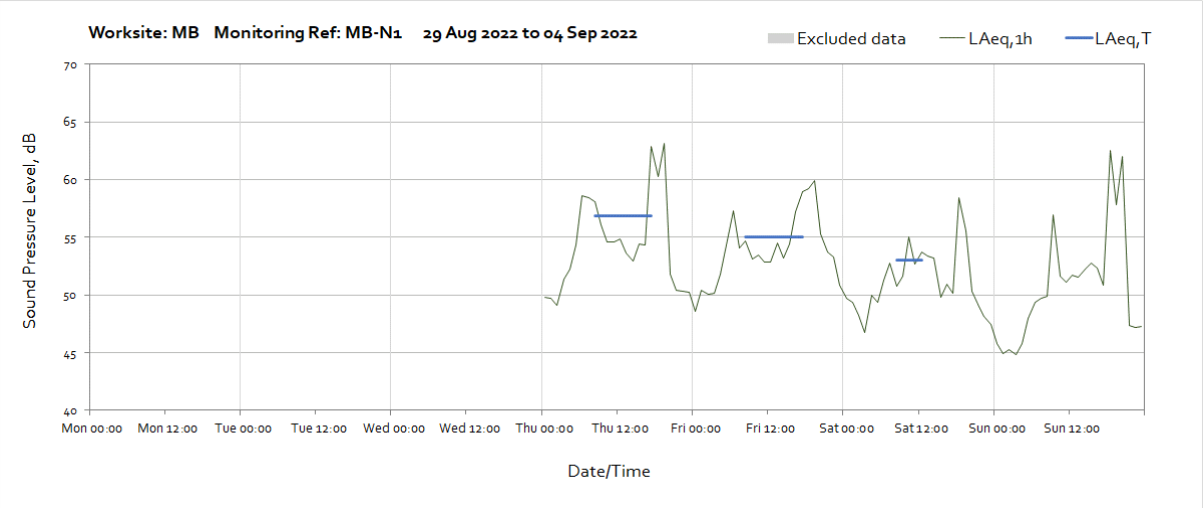

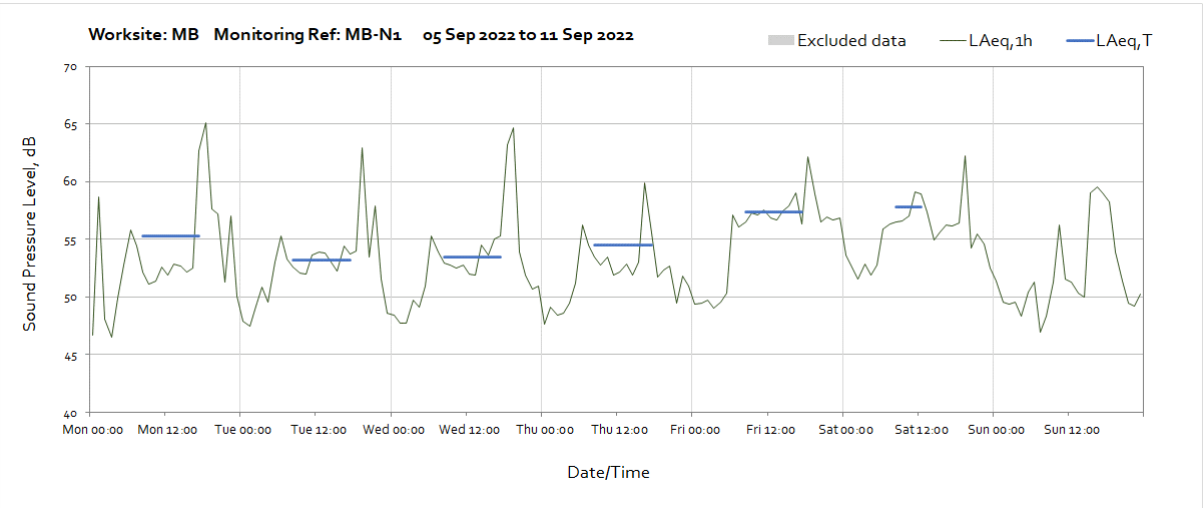

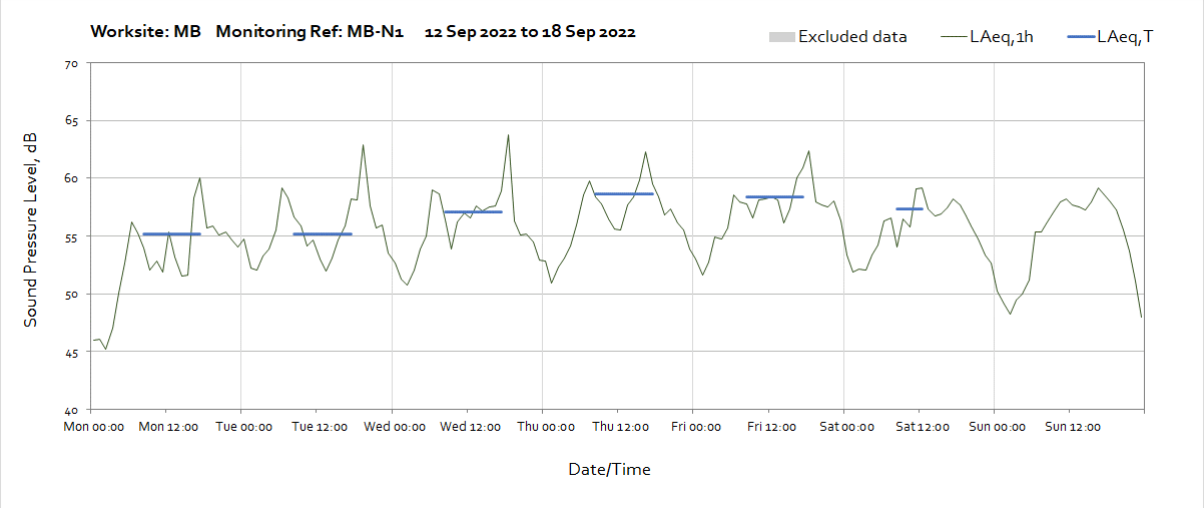
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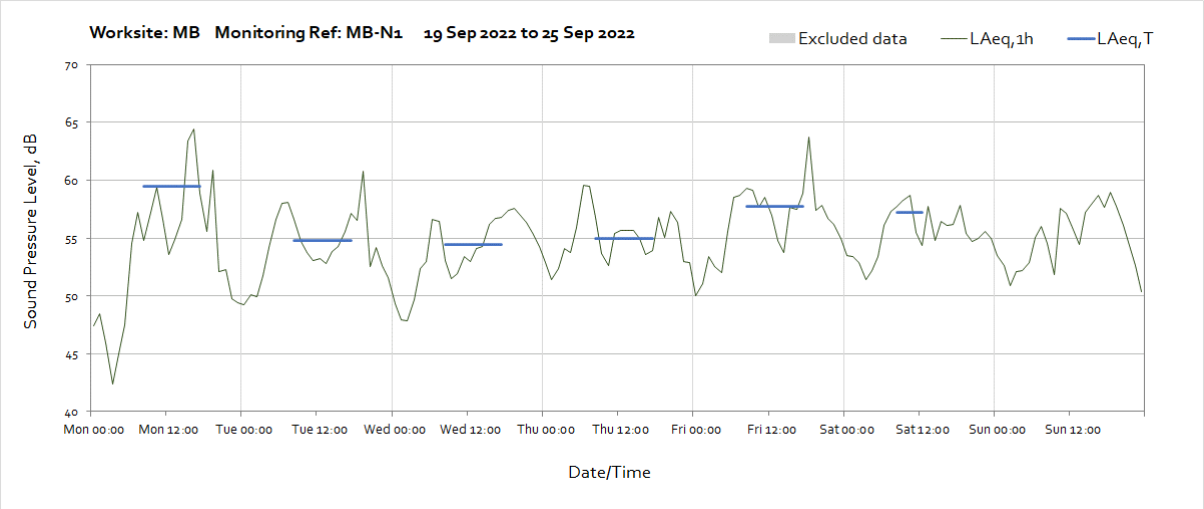
Date/Time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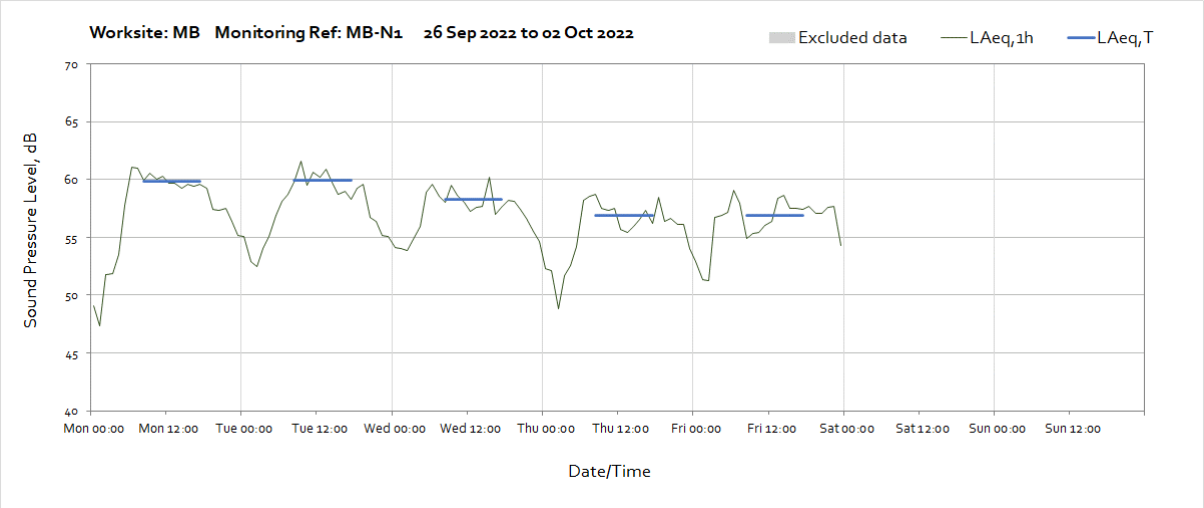
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Date/Time

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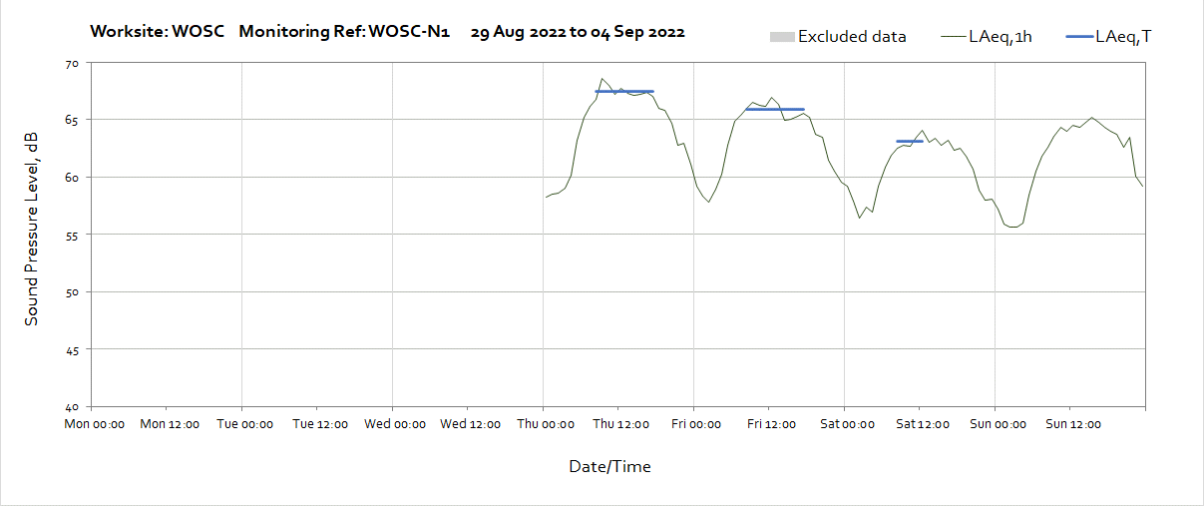
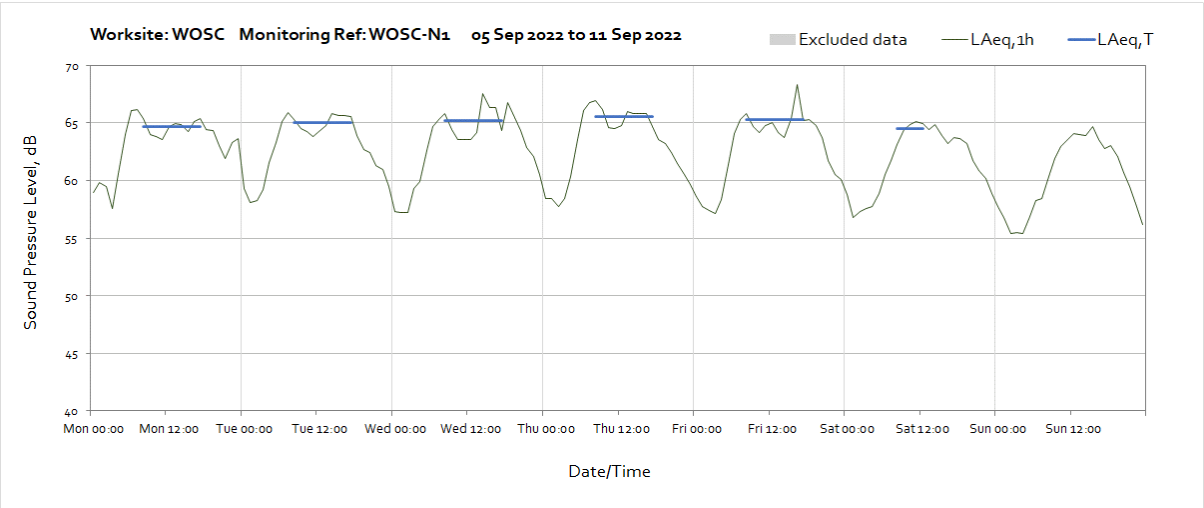
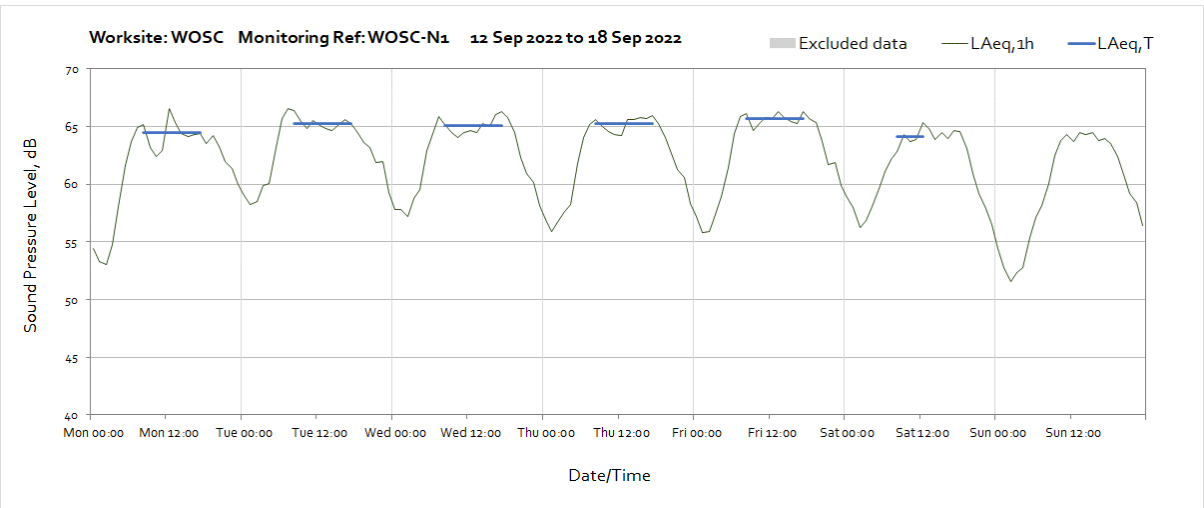
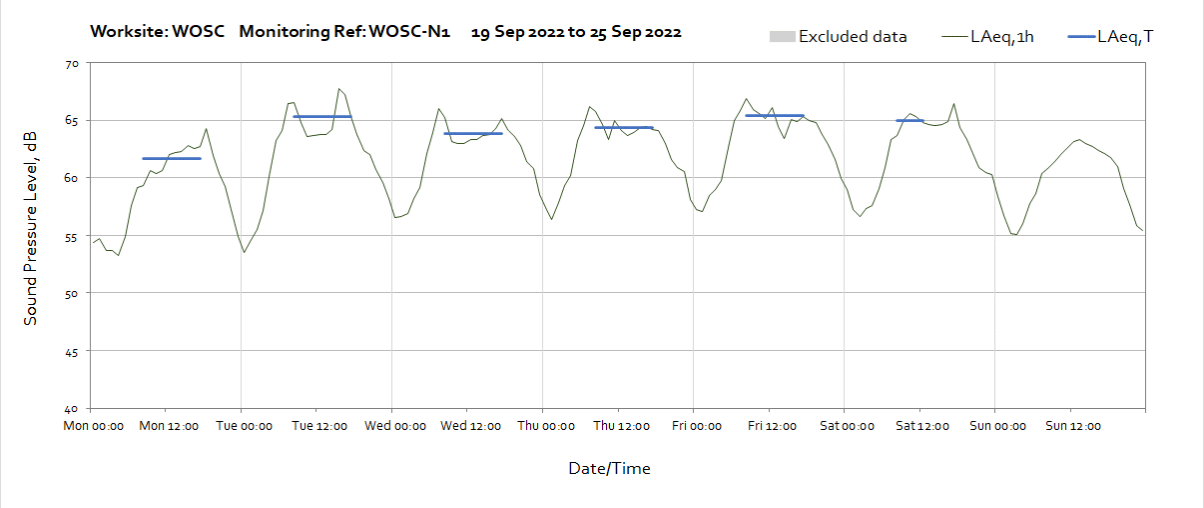
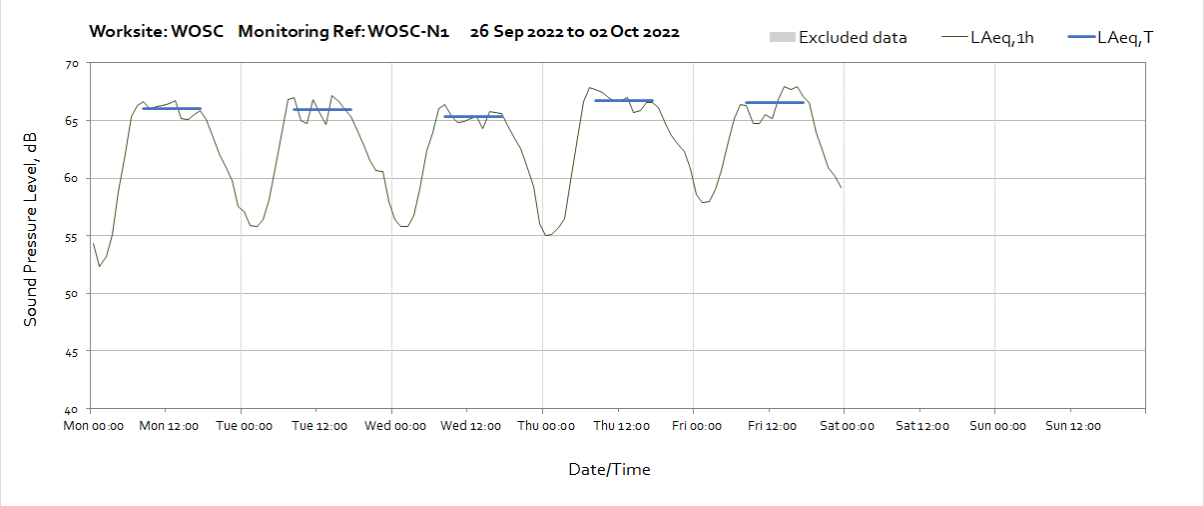


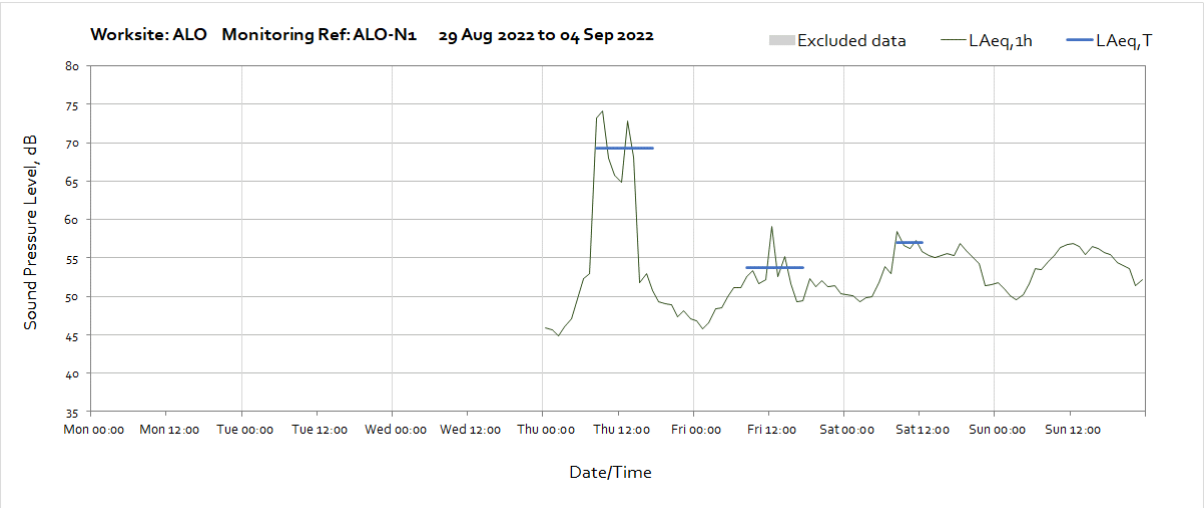


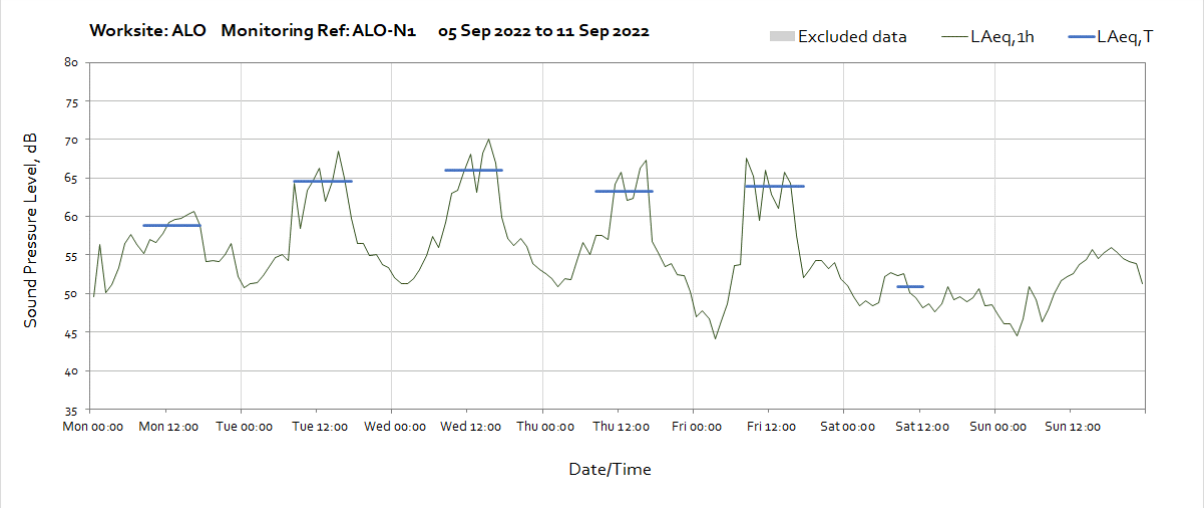






Worksite: ALO – Monitoring Ref: ALO-N1

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LAeq,T
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70
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Wed 00:00
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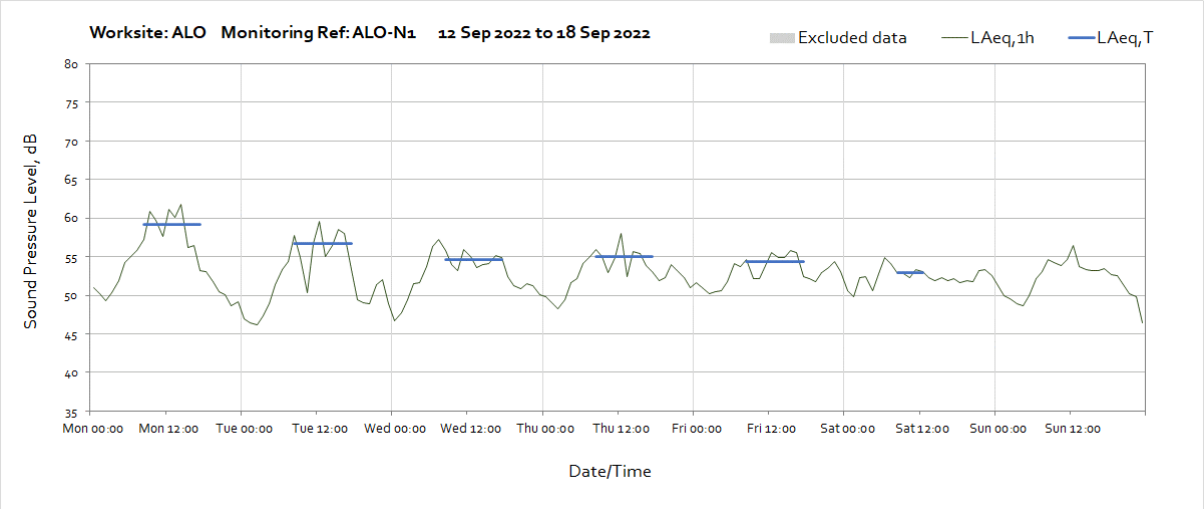
Sun 12:00
Date/Time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Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
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50
45
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35
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Tue 12:00
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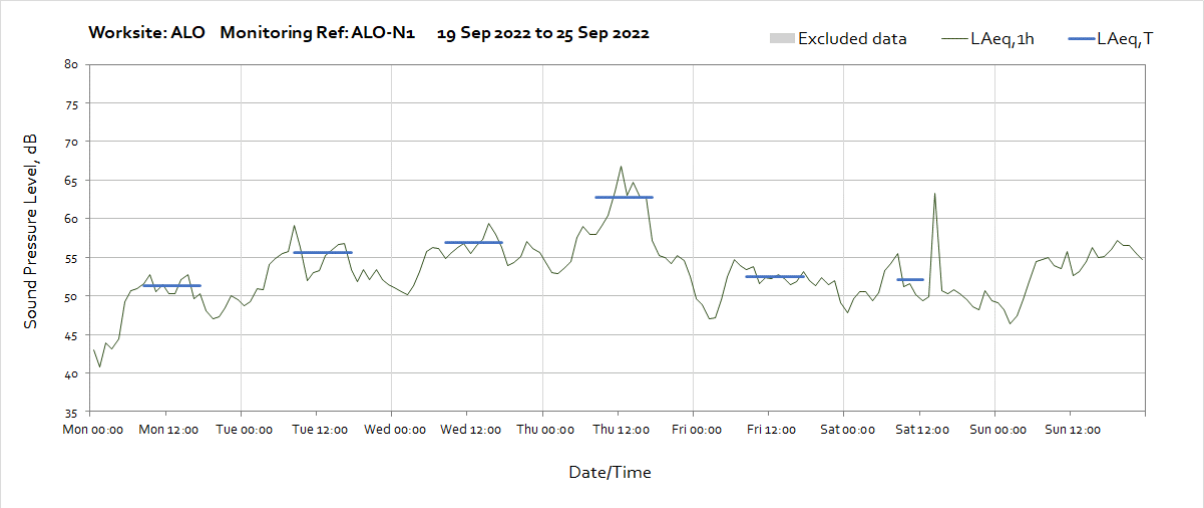
Date/Time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Excluded data
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LAeq,T
Sound Pressure Level, dB
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70
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Mon 12:00
Tue 00:00
Tue 12:00
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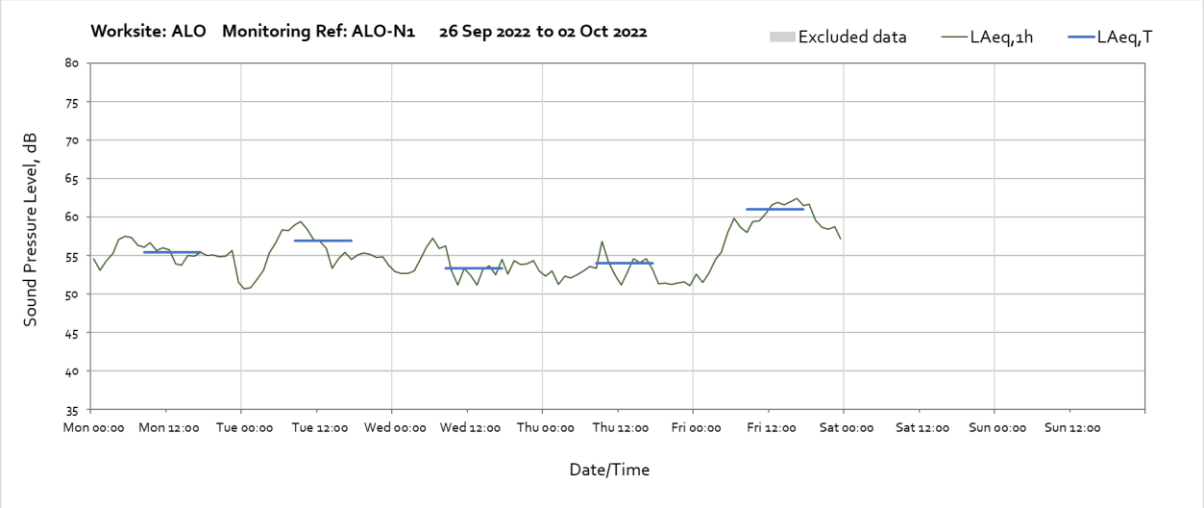
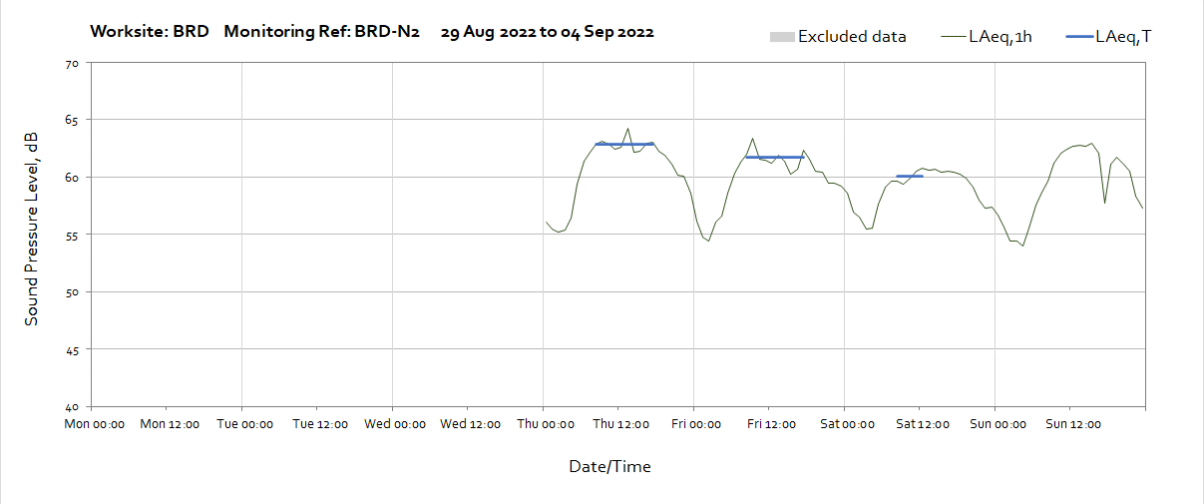
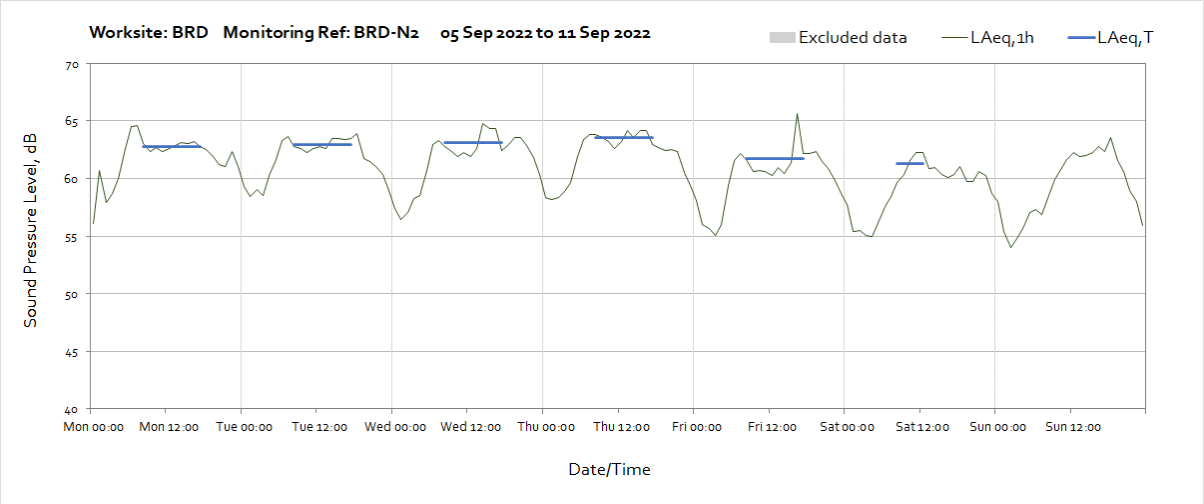
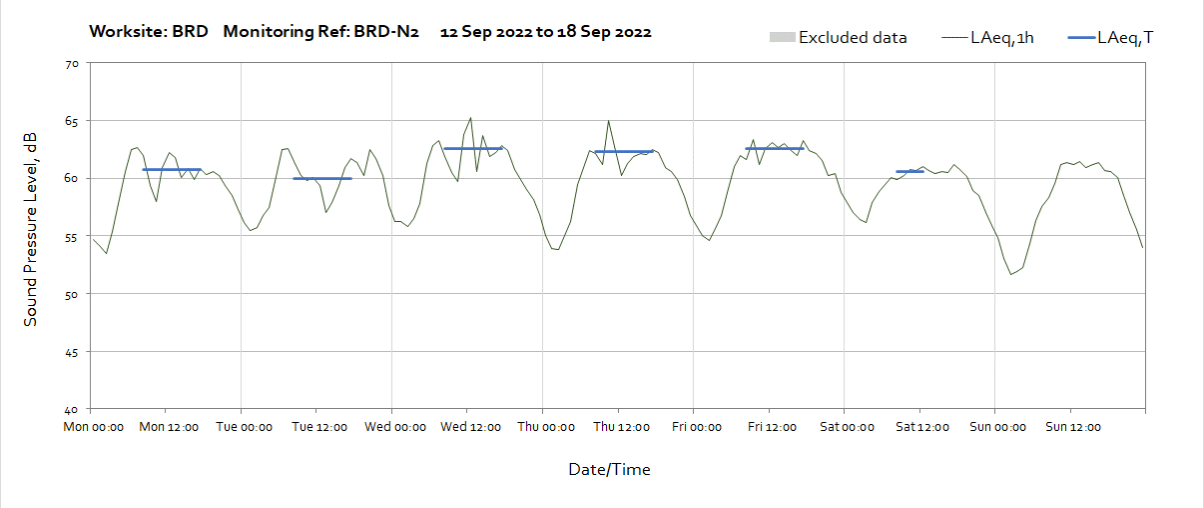
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

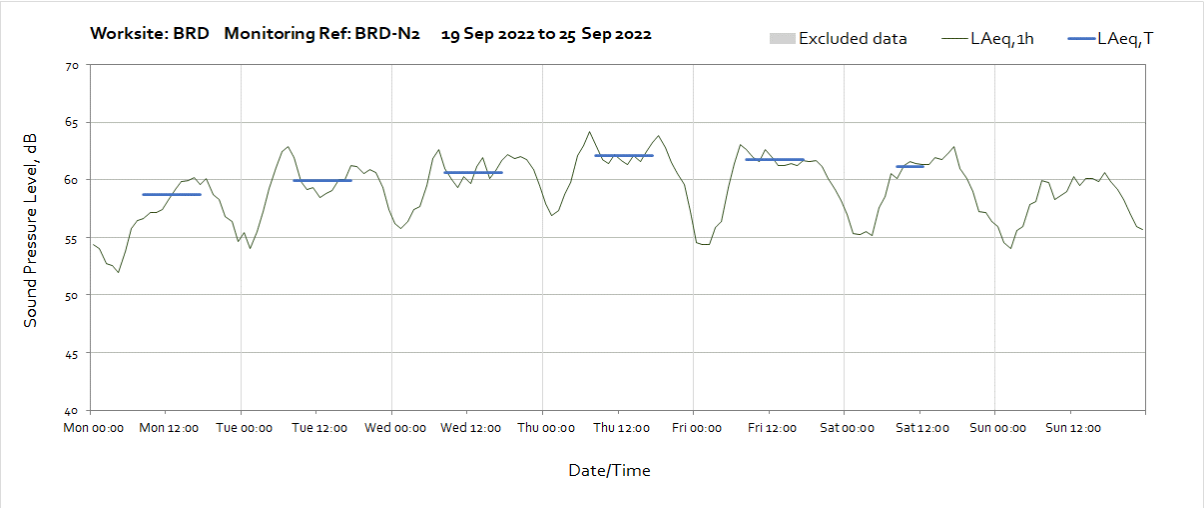


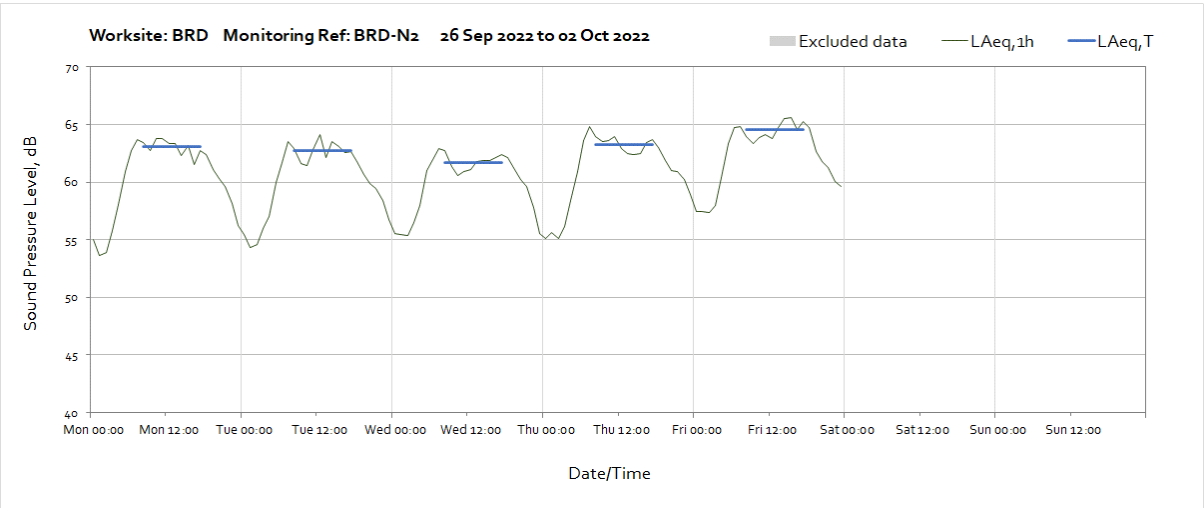
Worksite: BRD - Monitoring Ref: BRD-N2



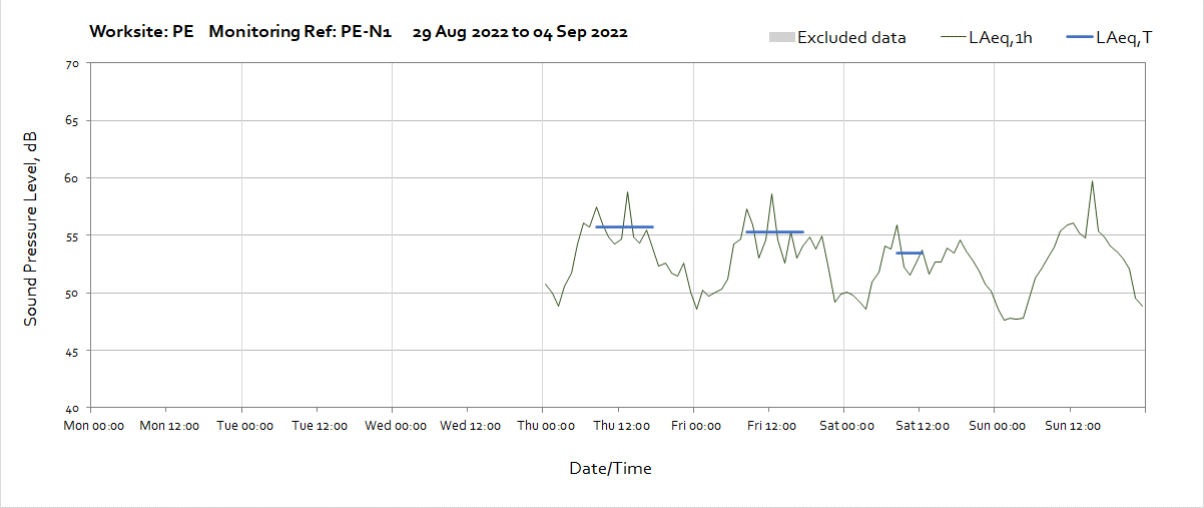


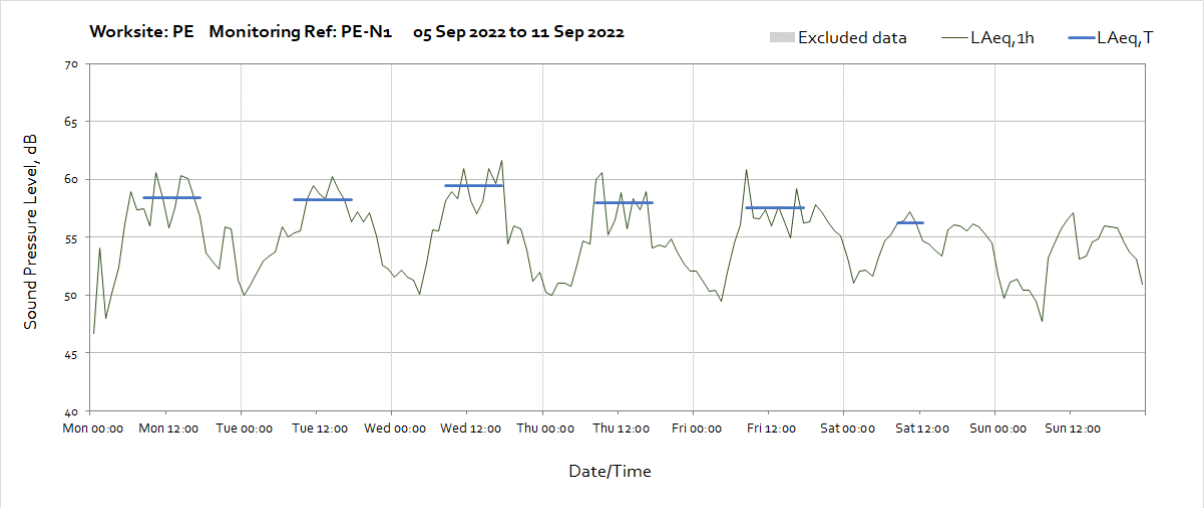

Worksite: BRD Monitoring Ref: BRD-N2 12 Sep 2022 to 18 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

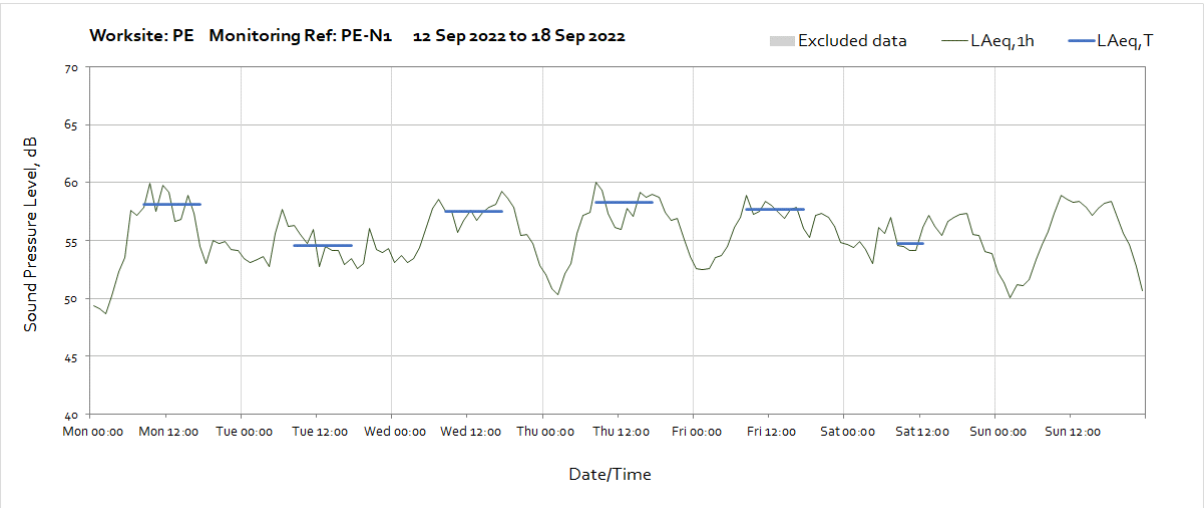

Worksite: BRD Monitoring Ref: BRD-N2 19 Sep 2022 to 25 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

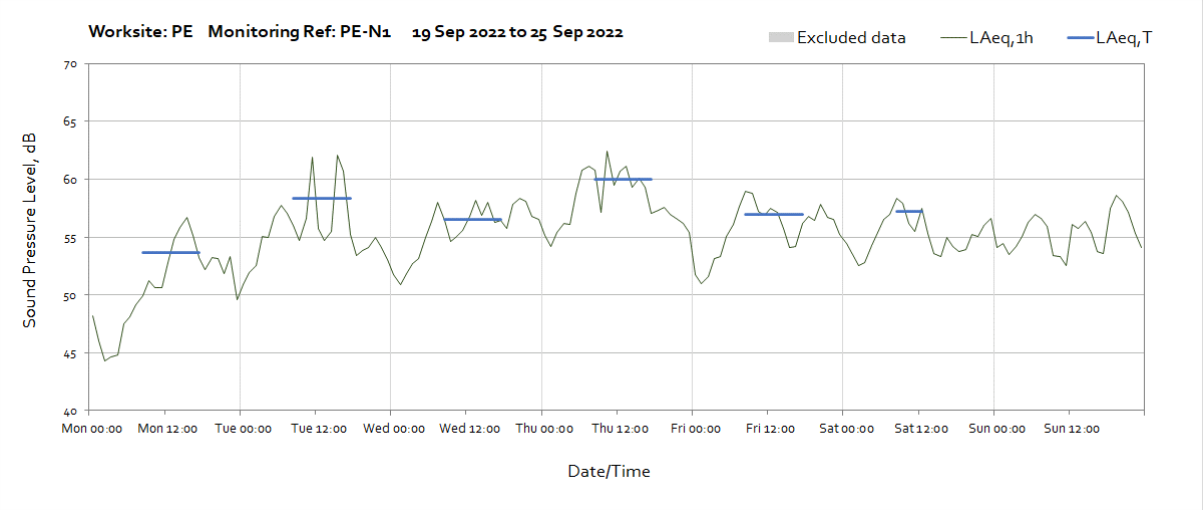

Worksite: BRD Monitoring Ref: BRD-N2 26 Sep 2022 to 02 Oct 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

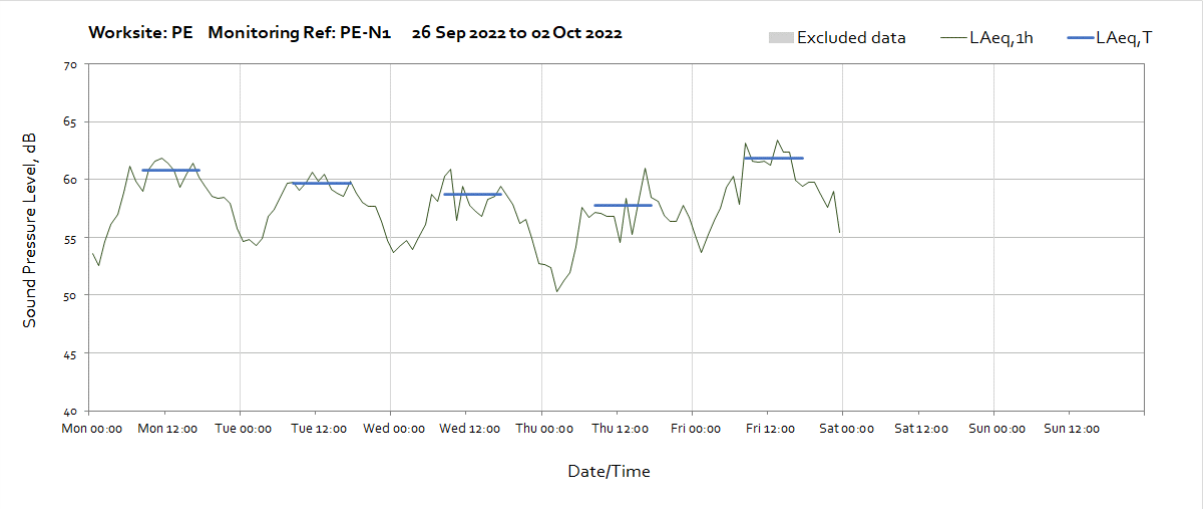
Worksite: PE - Monitoring Ref: PE-N1



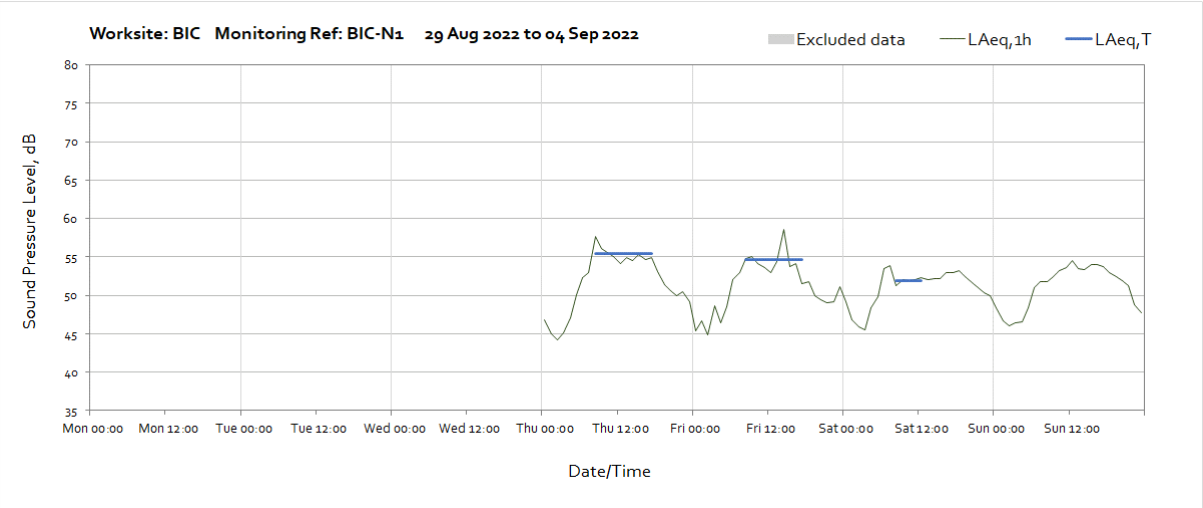


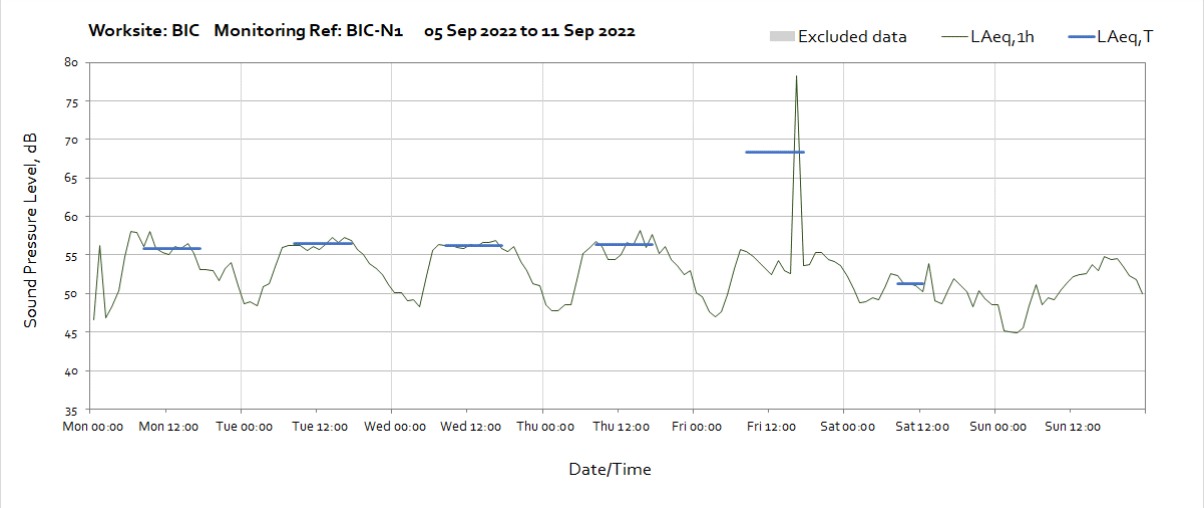


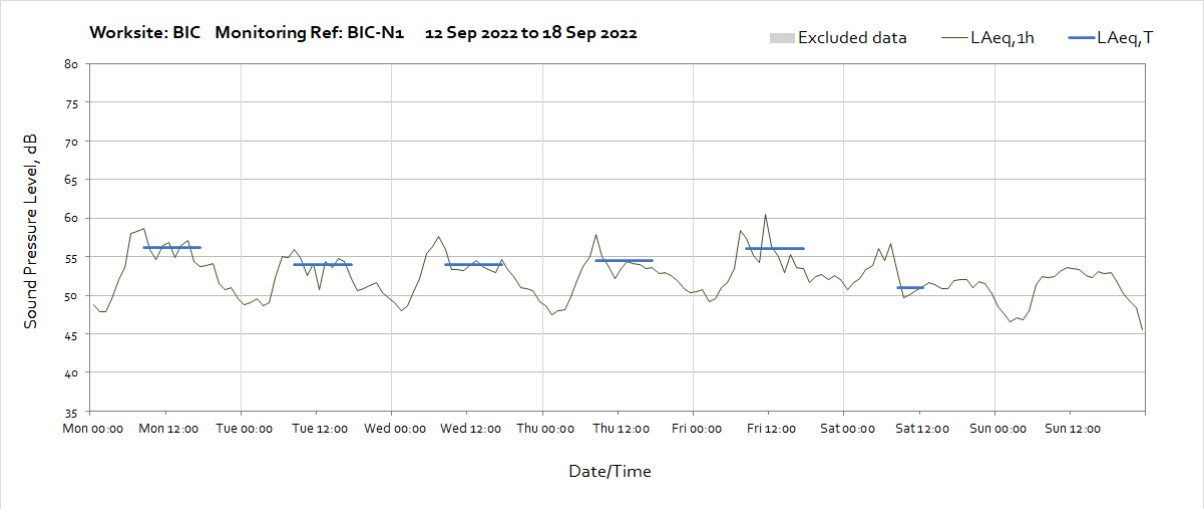


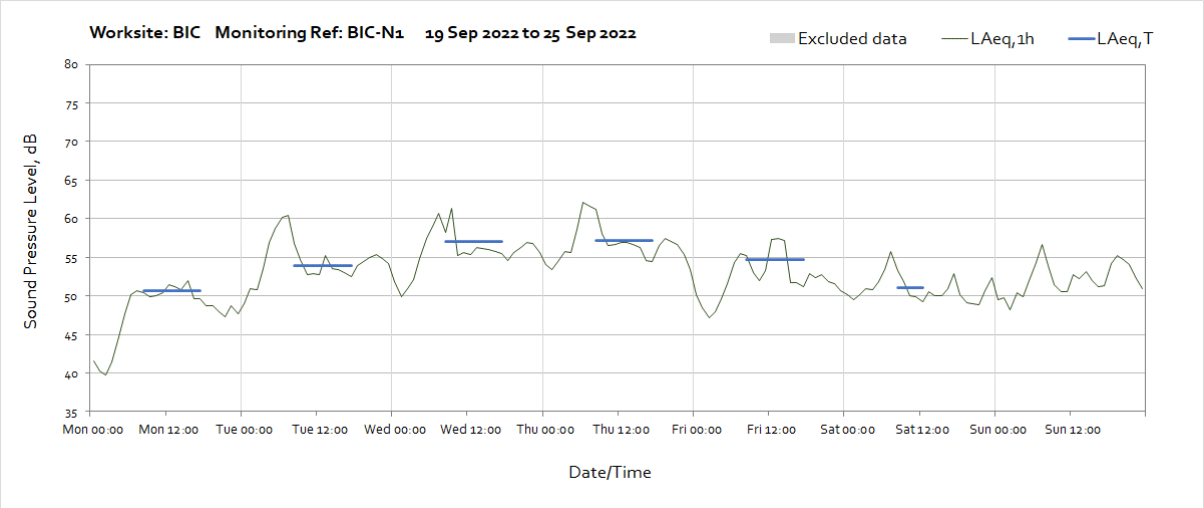


Worksite: BIC - Monitoring Ref: BIC-N1




Worksite: BIC Monitoring Ref: BIC-N1 05 Sep 2022 to 11 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: BIC Monitoring Ref: BIC-N1 12 Sep 2022 to 18 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: BIC Monitoring Ref: BIC-N1 19 Sep 2022 to 25 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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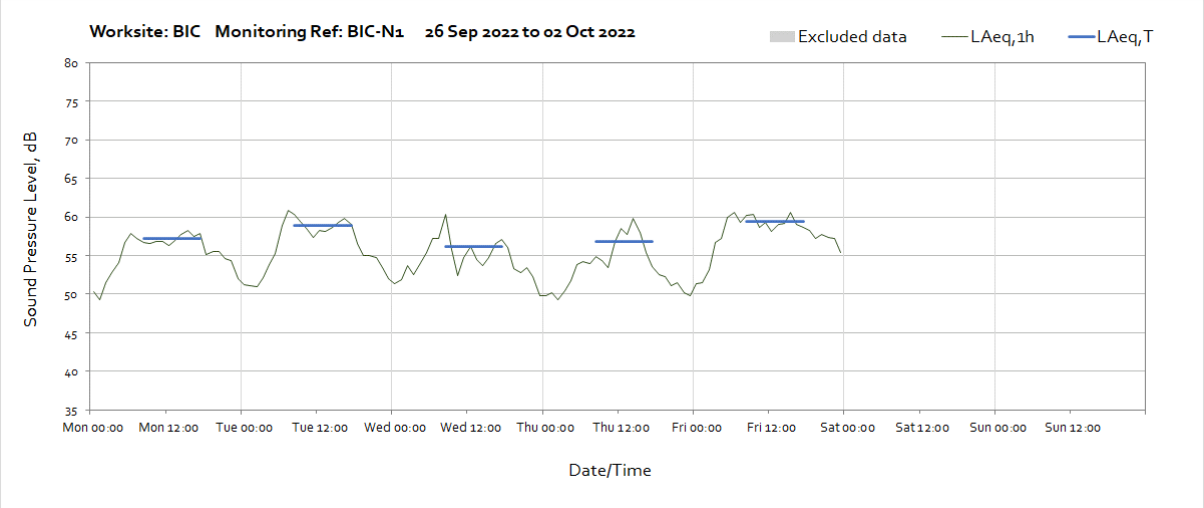
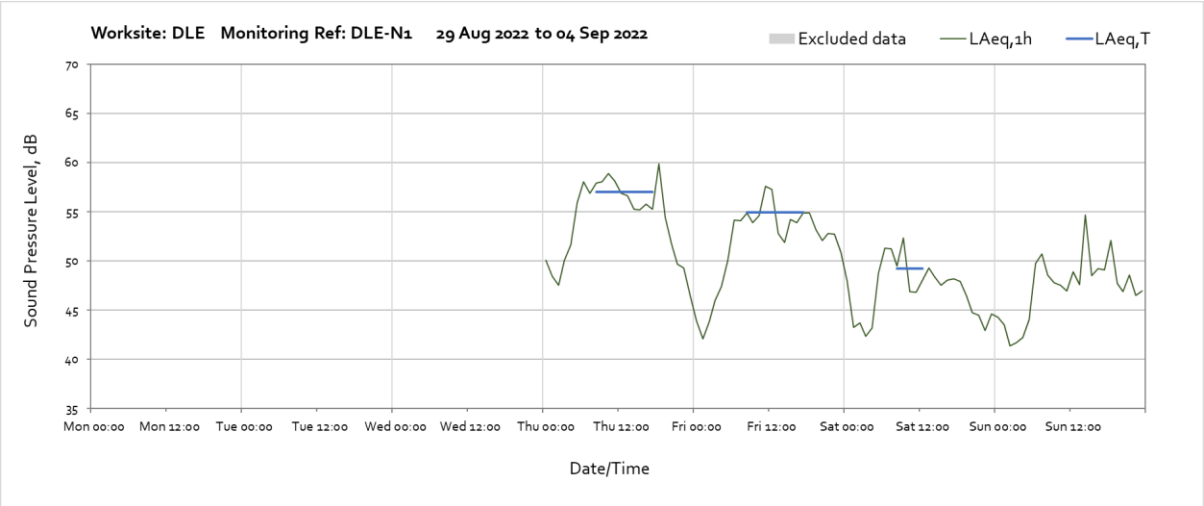
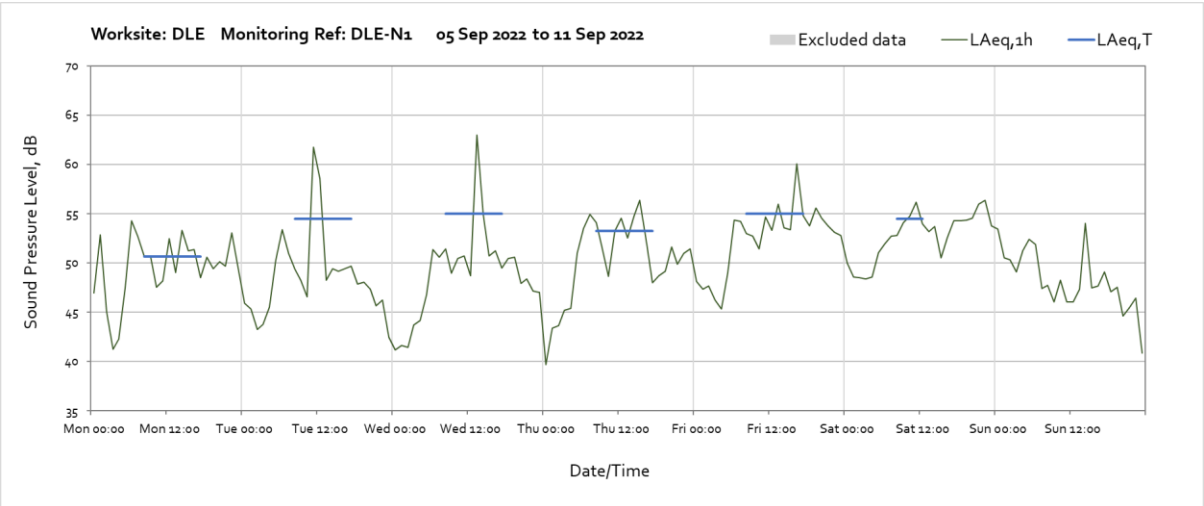
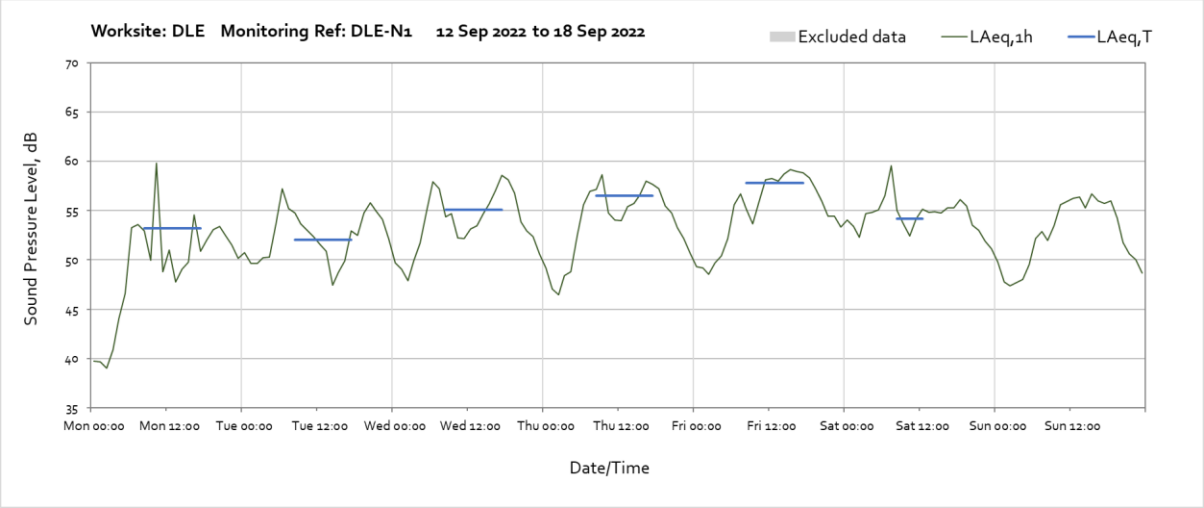
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

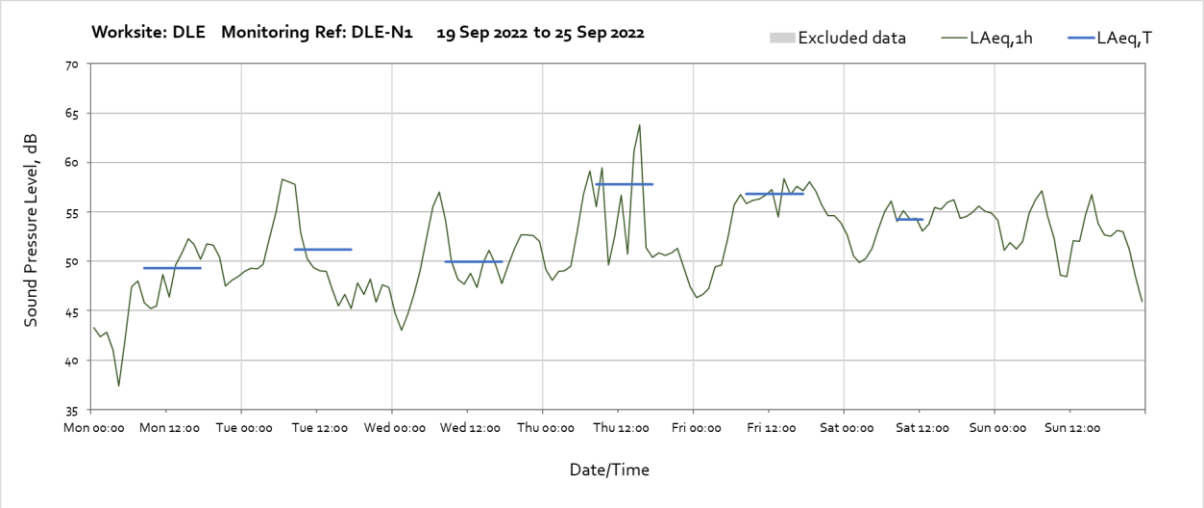


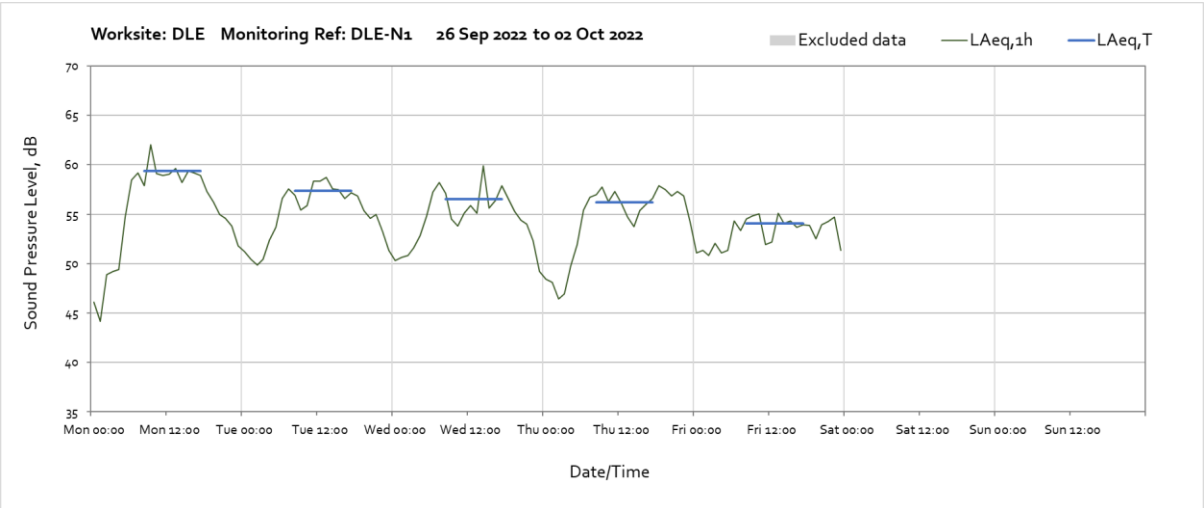
Worksite: DLE - Monitoring Ref: DLE-N1



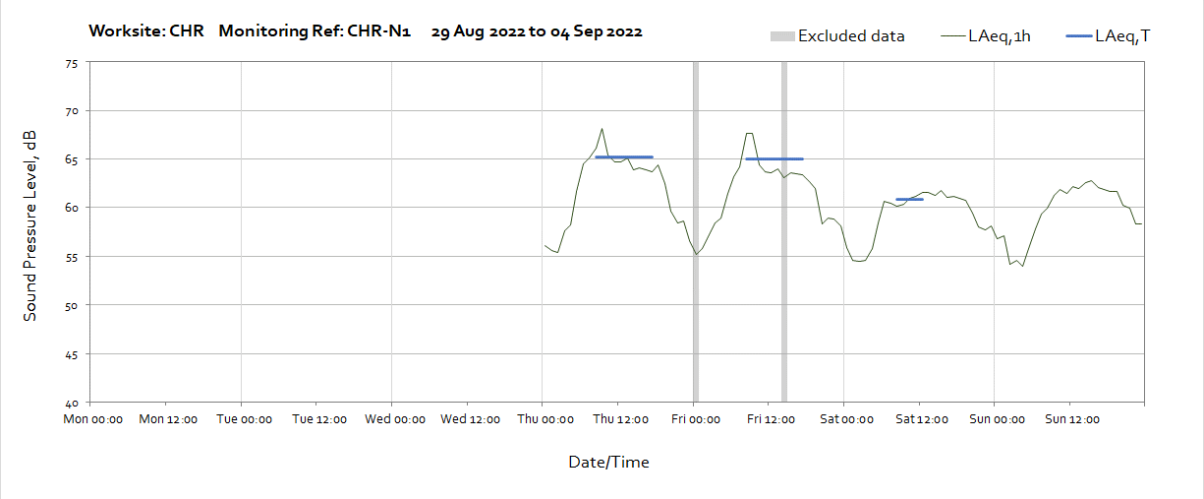


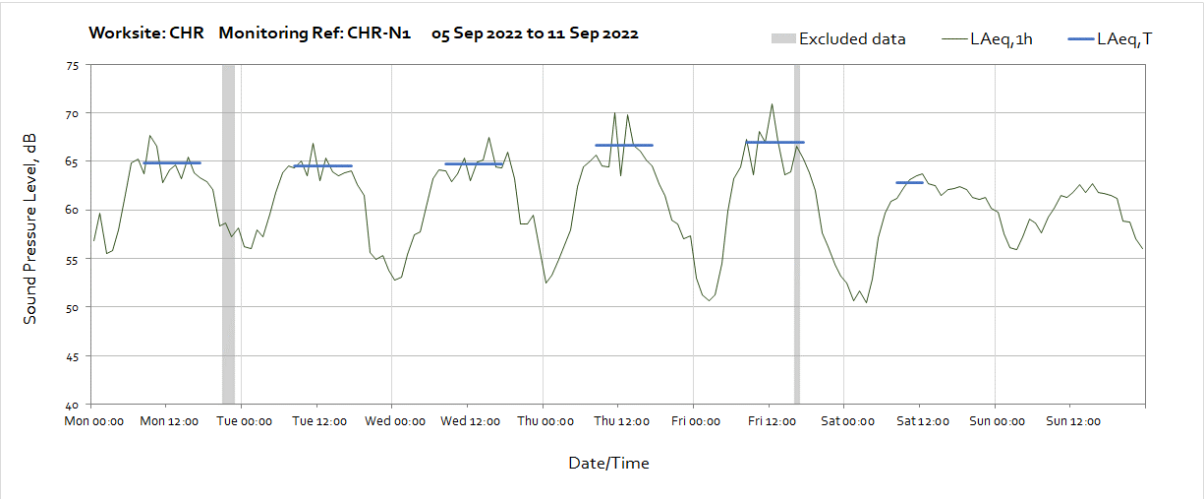

Worksite: DLE Monitoring Ref: DLE-N1 12 Sep 2022 to 18 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

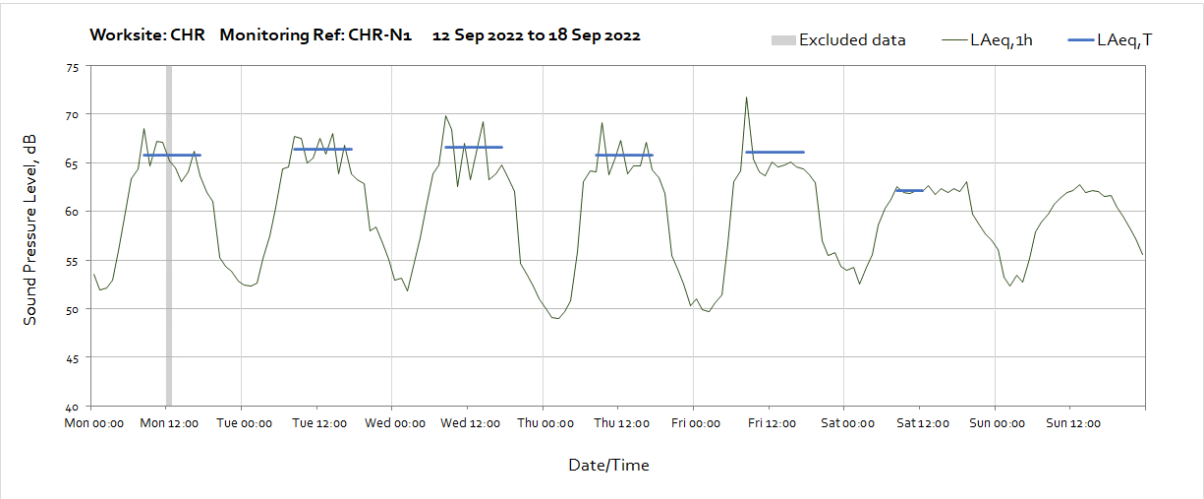

Worksite: DLE Monitoring Ref: DLE-N1 19 Sep 2022 to 25 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

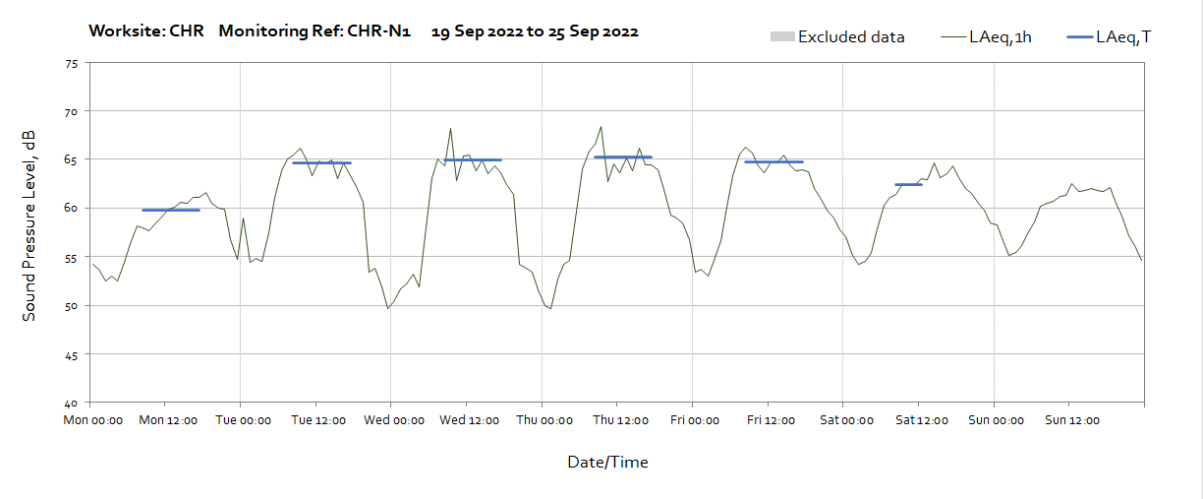

Worksite: DLE Monitoring Ref: DLE-N1 26 Sep 2022 to 02 Oct 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

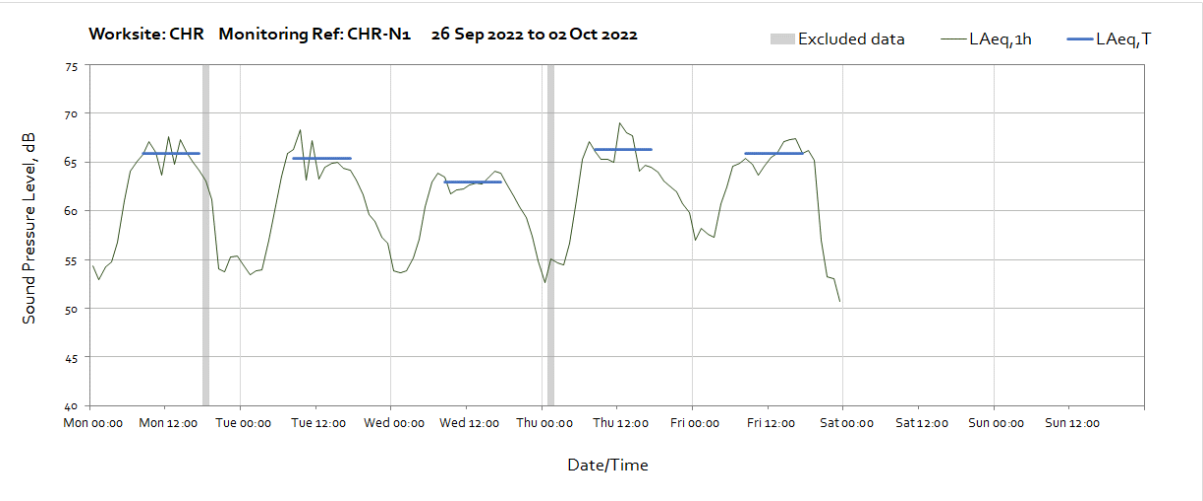
Worksite: CHR - Monitoring Ref: CHR-N1



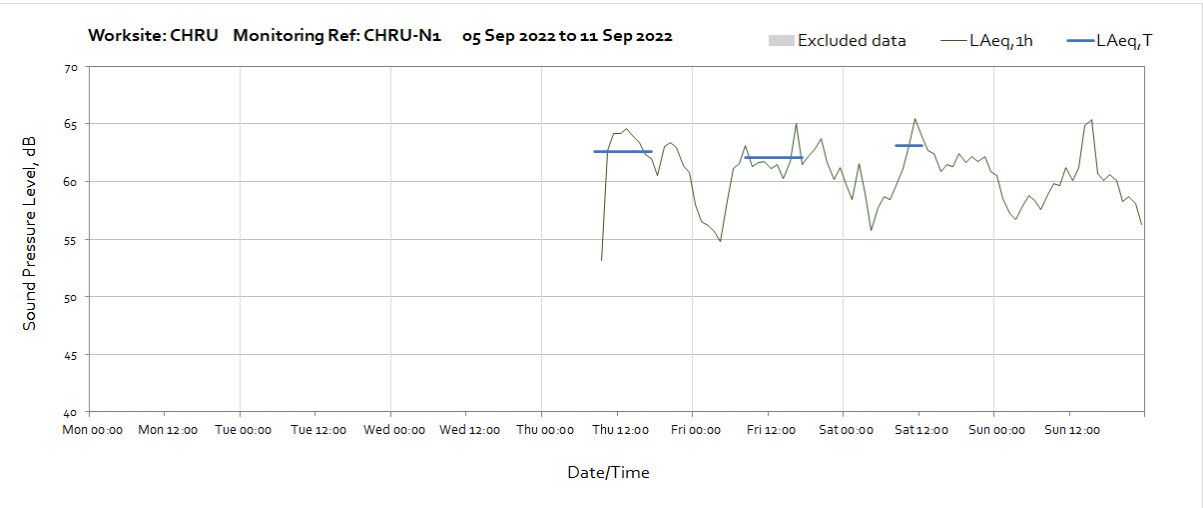




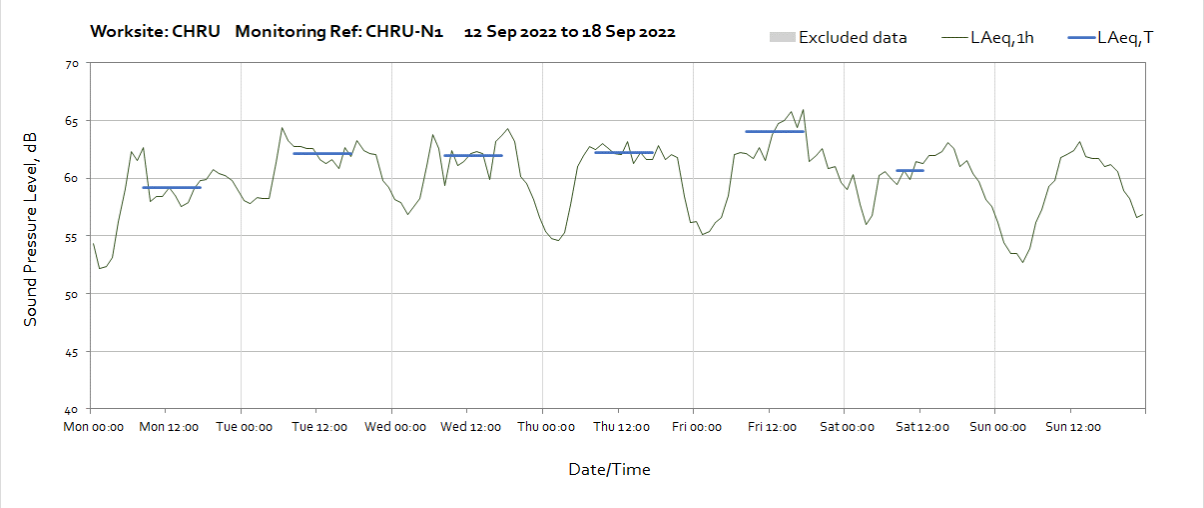


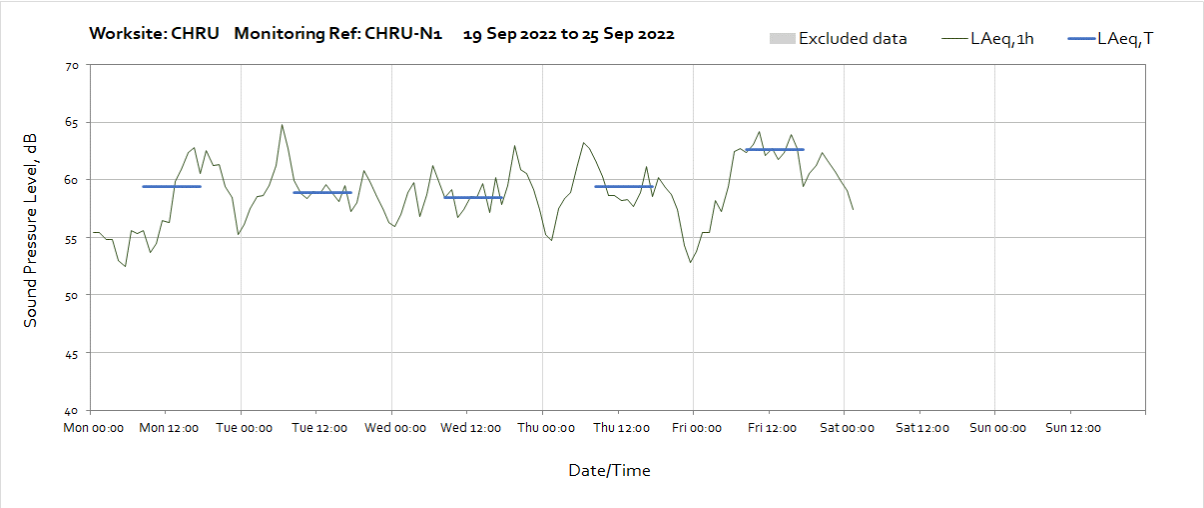


Worksite: CHR - Monitoring Ref: CHRU-N1



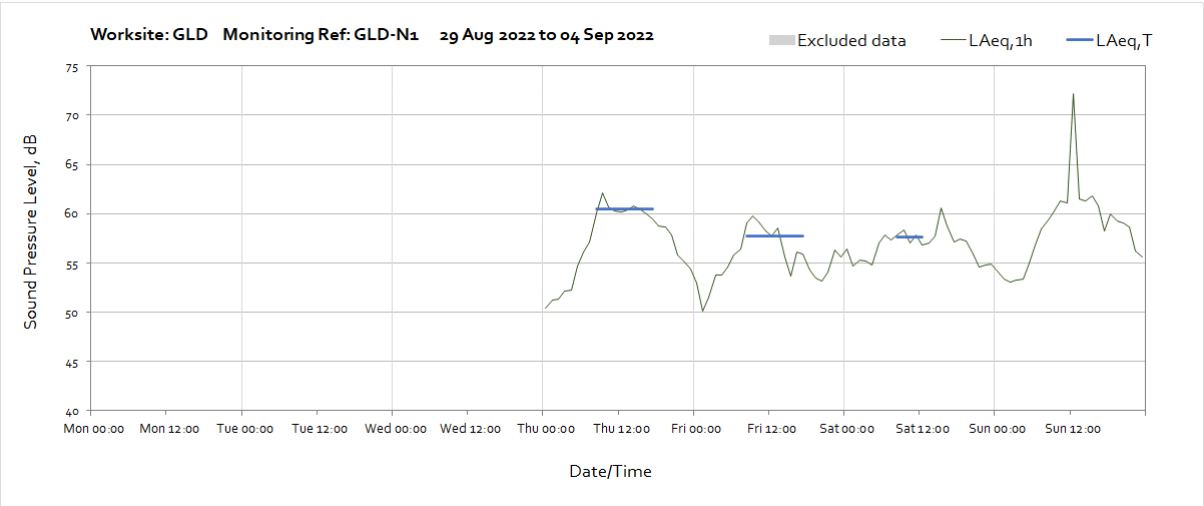
Note: Noise monitor installed at 09:00 on Thursday 8th September 2022.

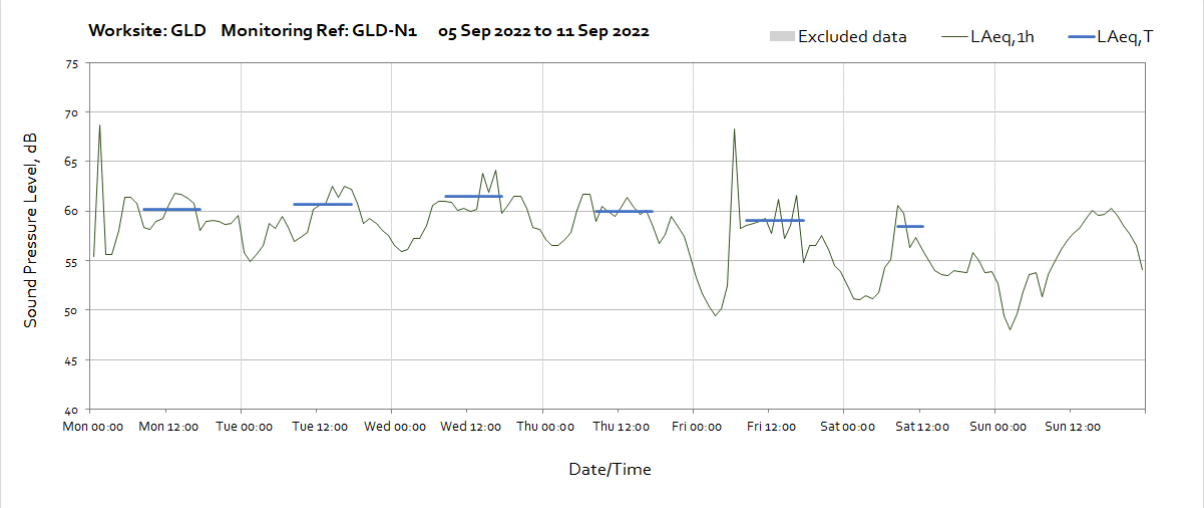


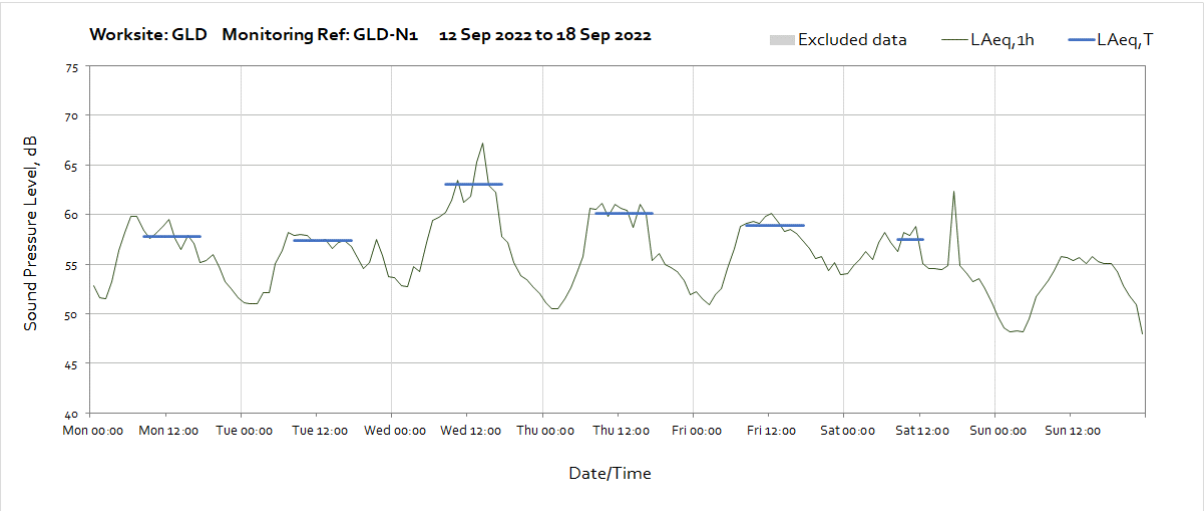


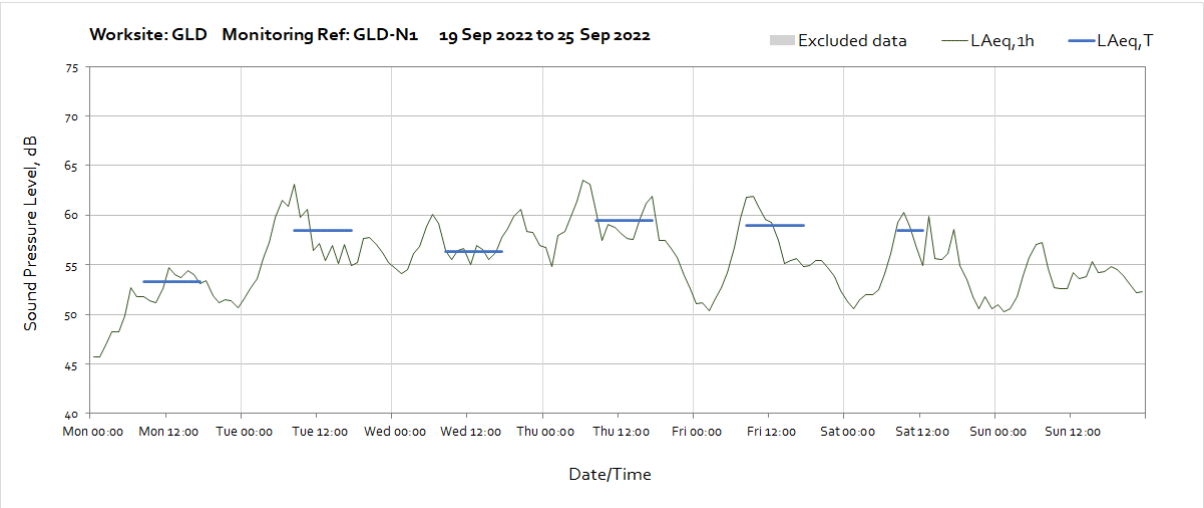
Note: Missing data from 02:00 on Saturday 24th September 2022 until the end of the month was due to loss of power to battery caused by the theft of solar panels.

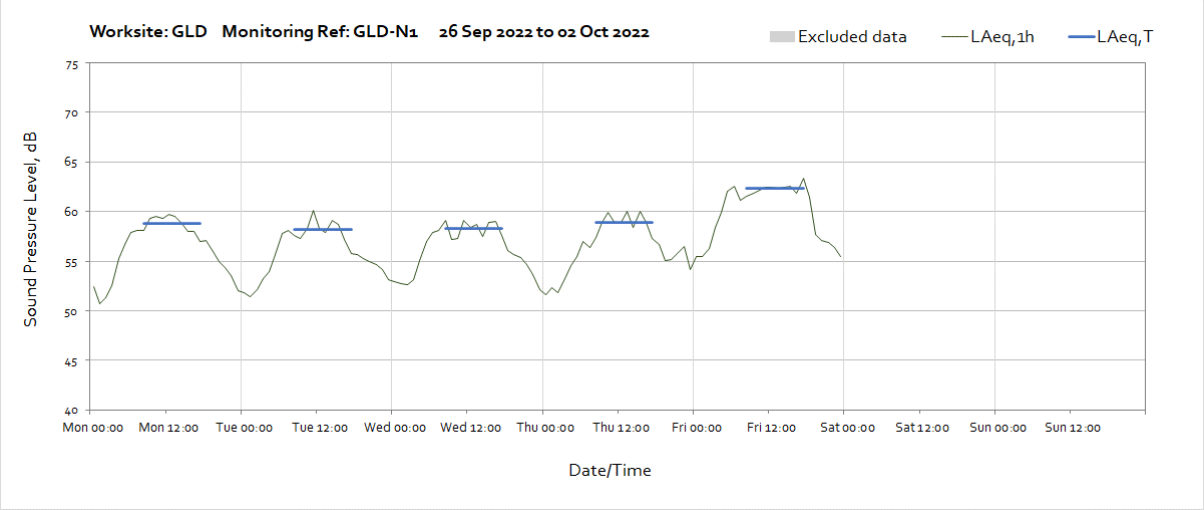
Worksite: GLD - Monitoring Ref: GLD-N1




Worksite: GLD Monitoring Ref: GLD-N1 05 Sep 2022 to 11 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: GLD Monitoring Ref: GLD-N1 12 Sep 2022 to 18 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

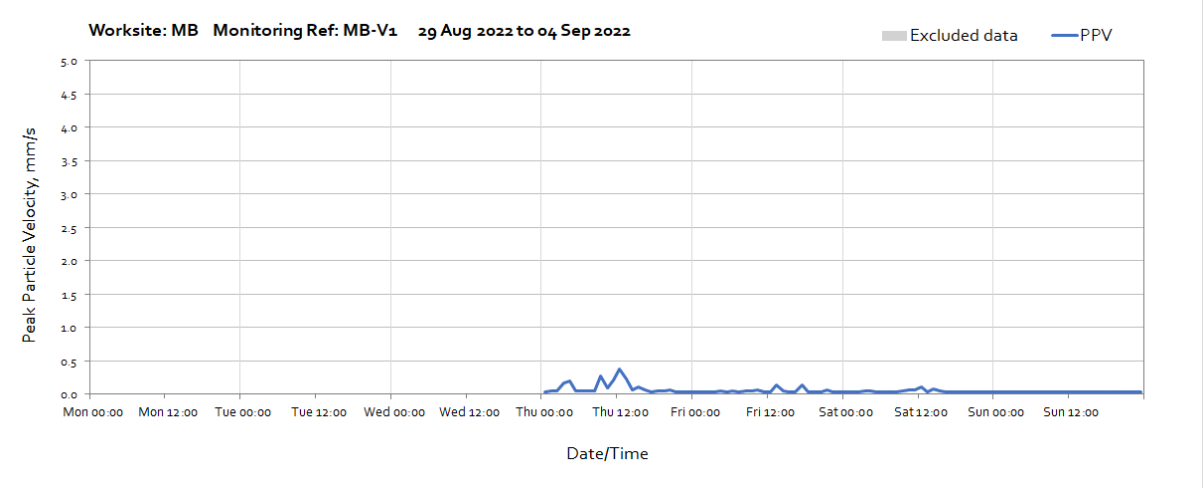

Worksite: GLD Monitoring Ref: GLD-N1 19 Sep 2022 to 25 Sep 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

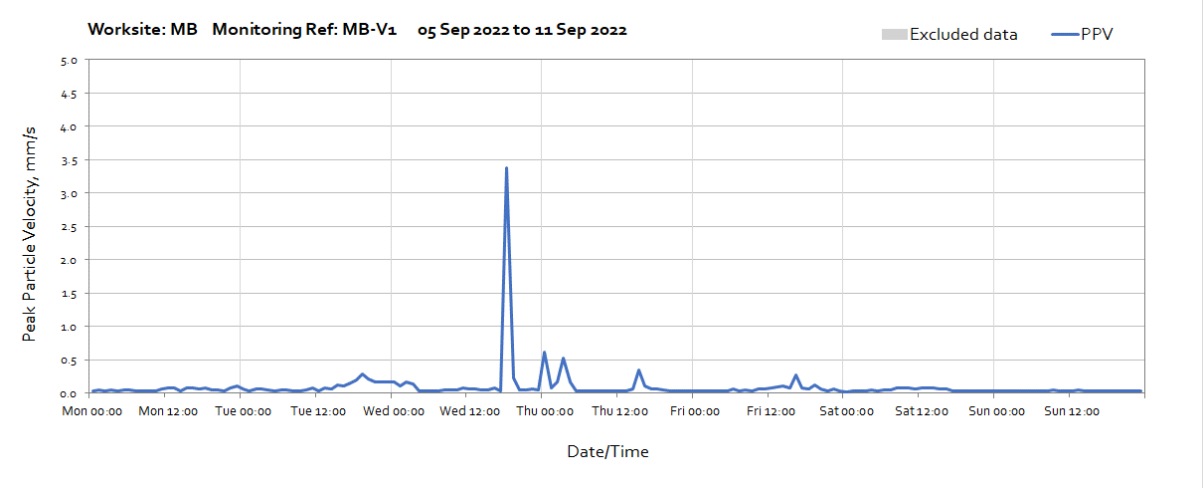

Worksite: GLD Monitoring Ref: GLD-N1 26 Sep 2022 to 02 Oct 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

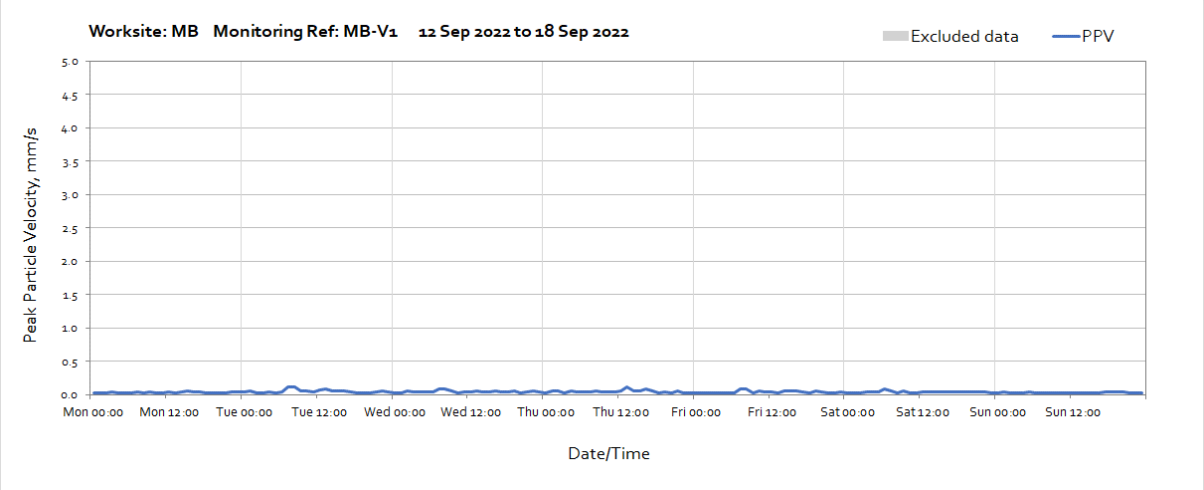
Vibration

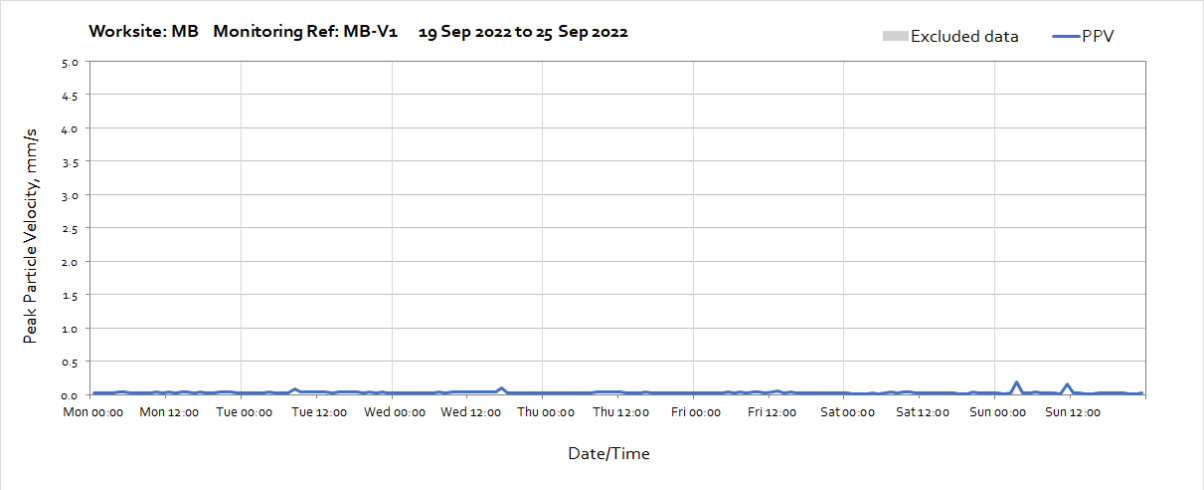
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axes x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative 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.

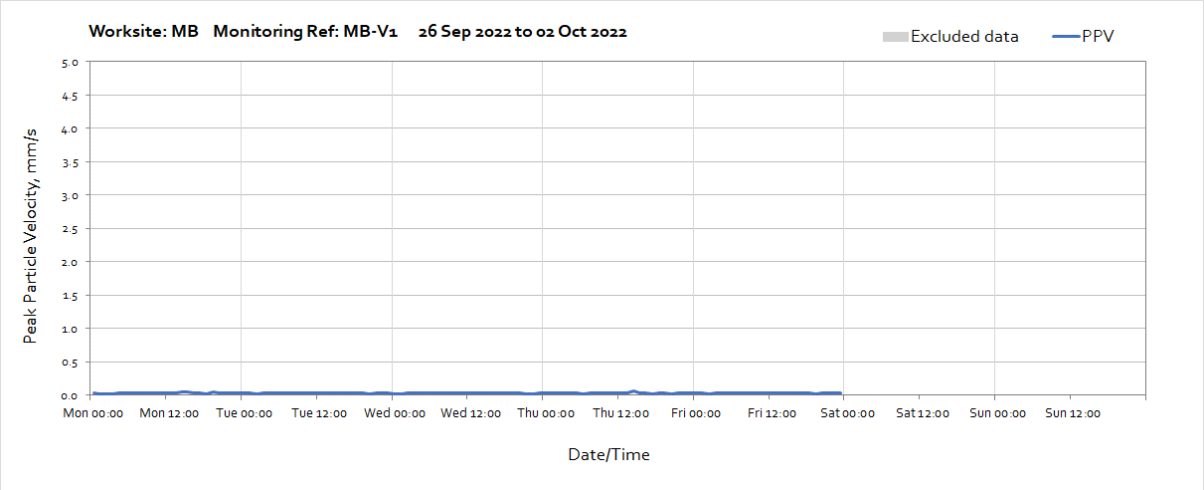
Worksite: MB – Monitoring Ref: MB-V1



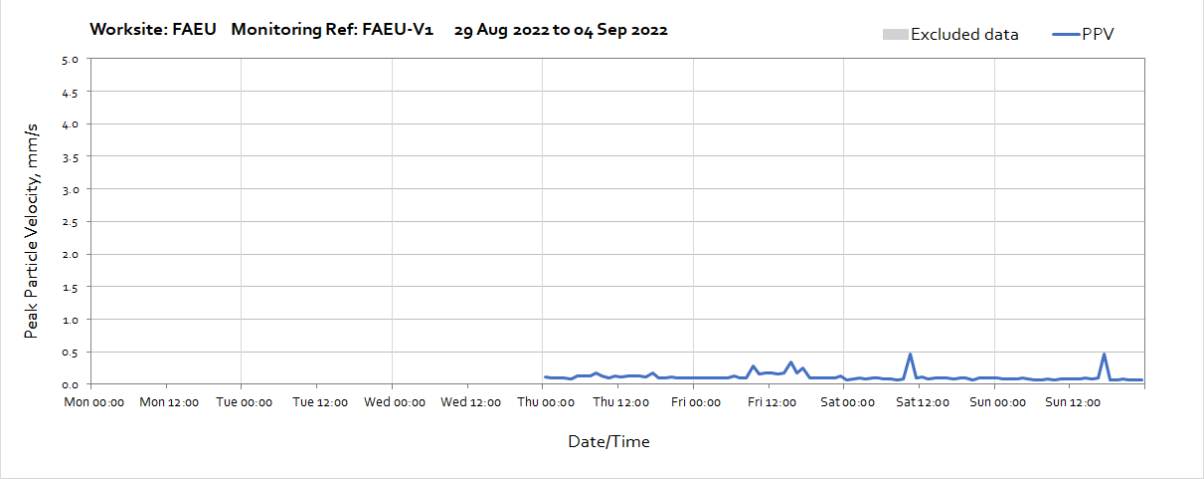


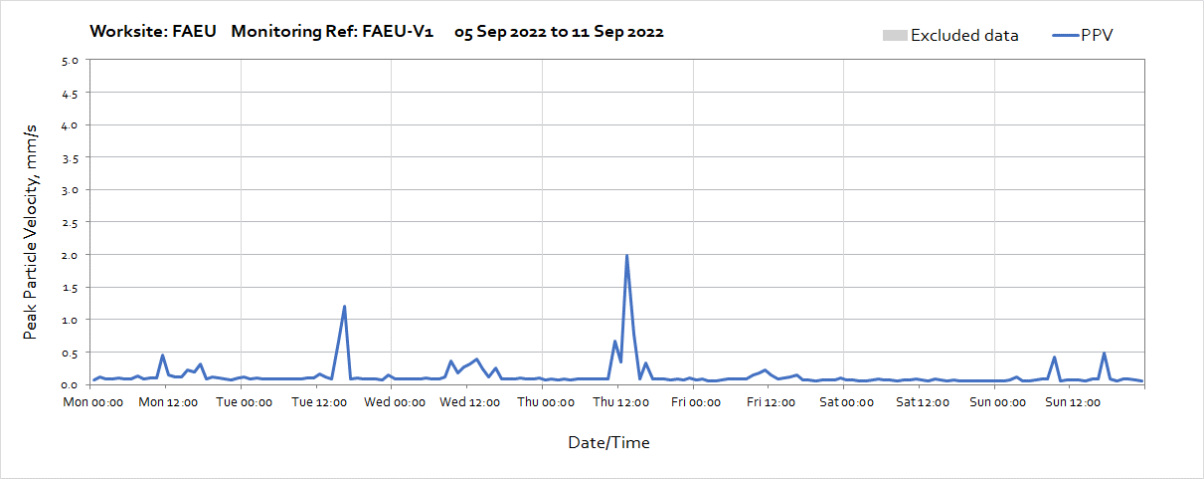

Worksite: MB Monitoring Ref: MB-V1 12 Sep 2022 to 18 Sep 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

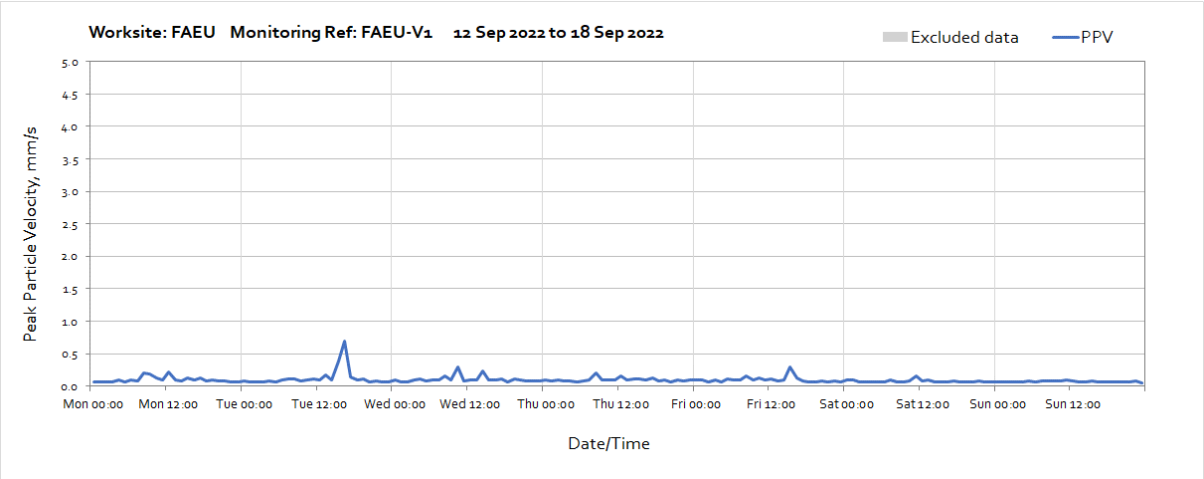

Worksite: MB Monitoring Ref: MB-V1 19 Sep 2022 to 25 Sep 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

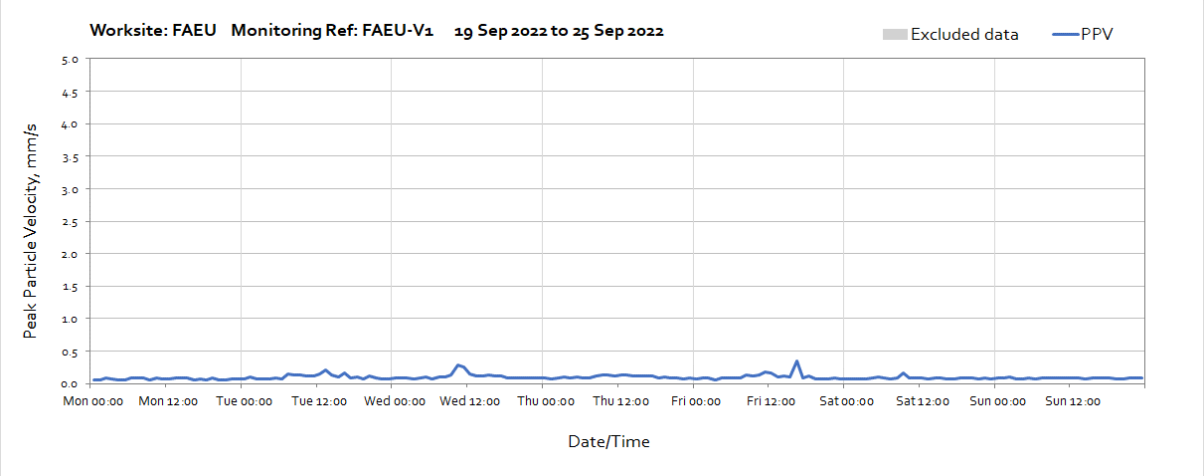

Worksite: MB Monitoring Ref: MB-V1 26 Sep 2022 to 02 Oct 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

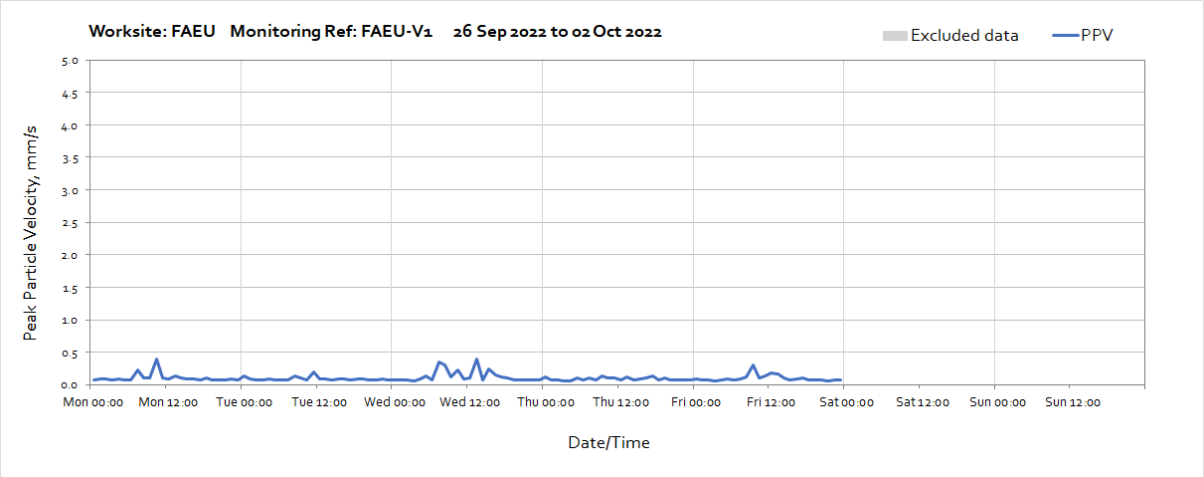
Worksite: FAEU – Monitoring Ref: FAEU-V1



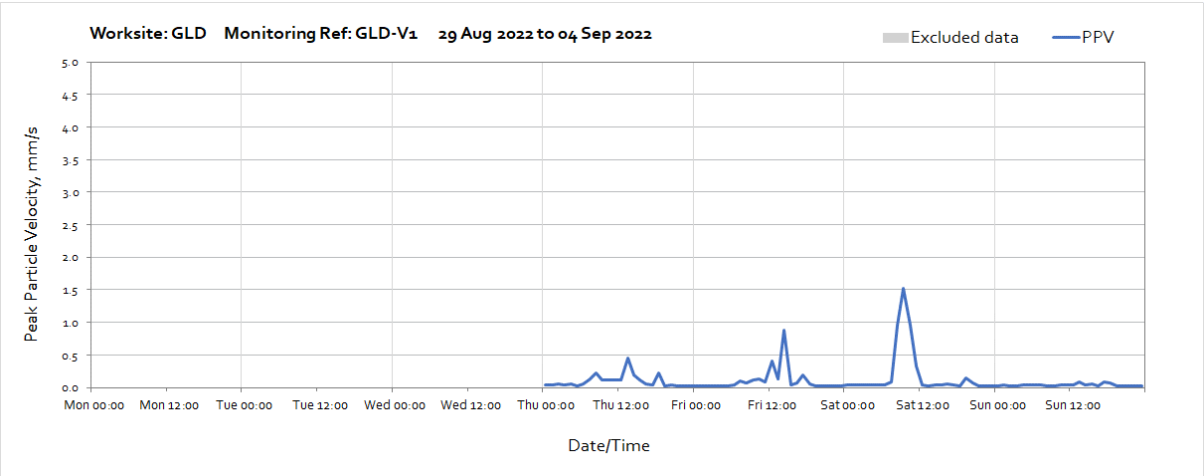


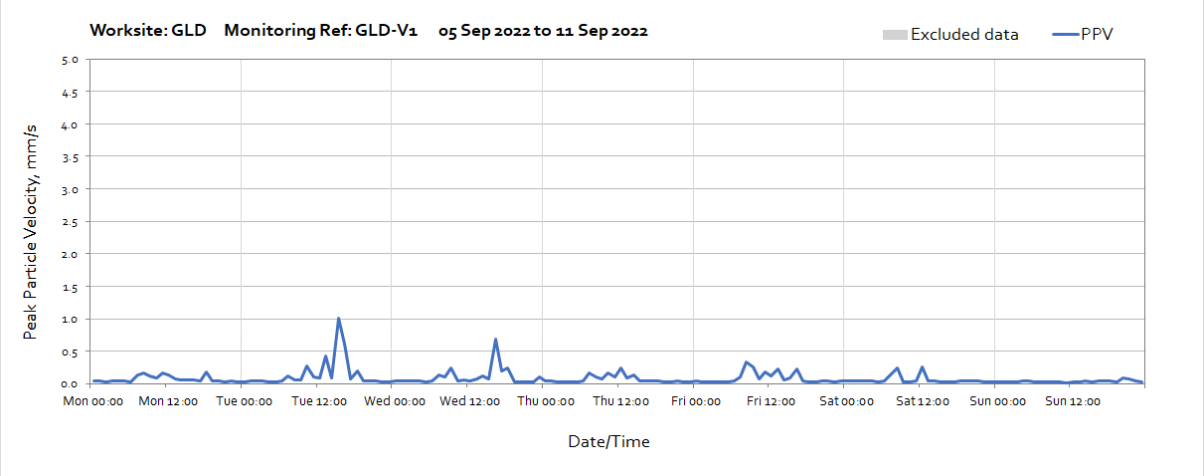


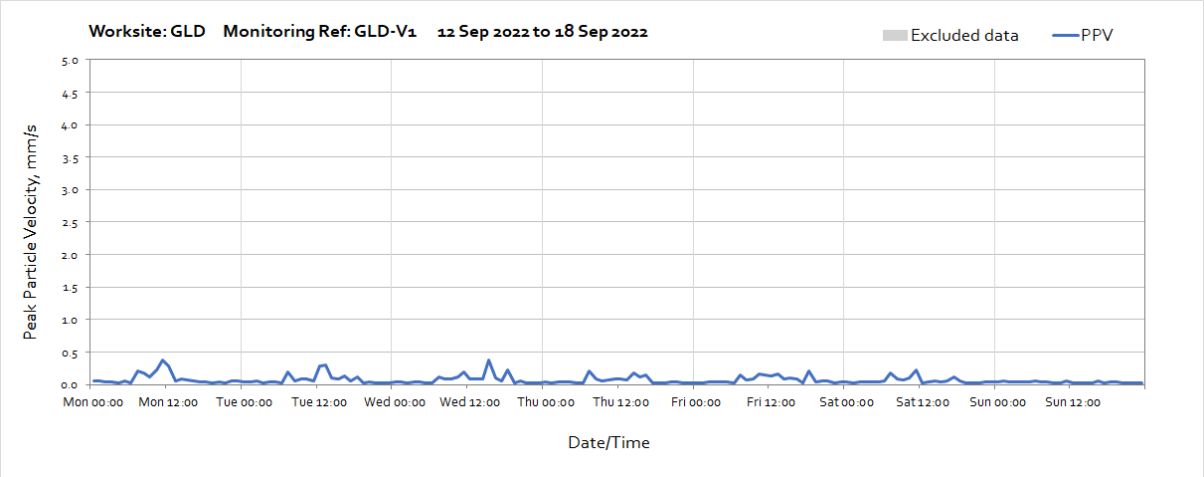


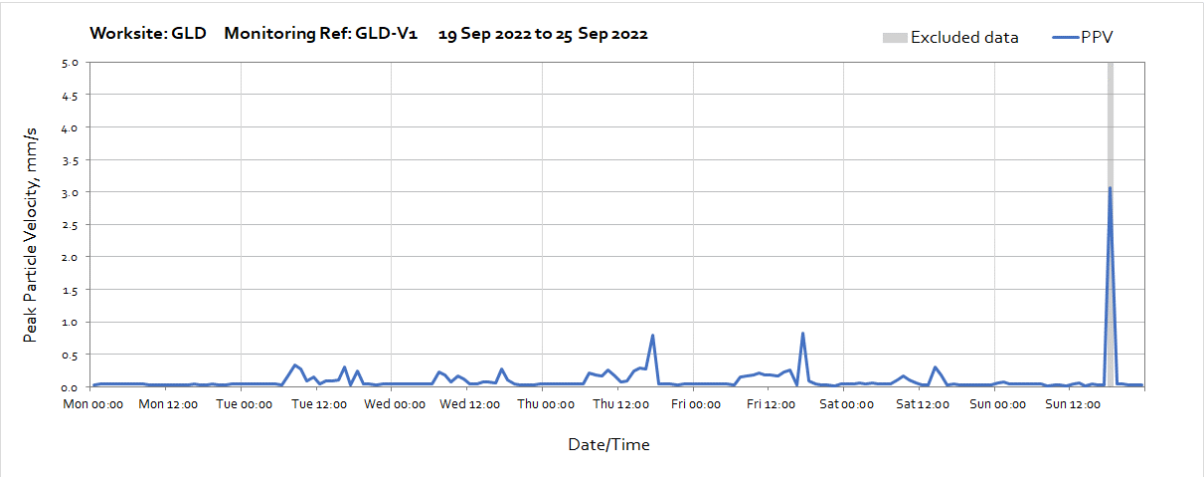


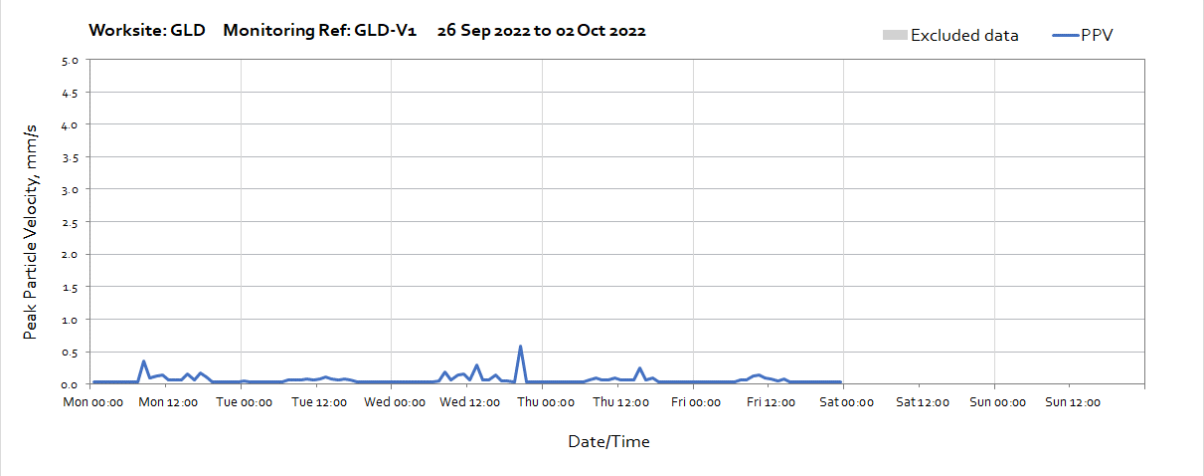
Worksite: GLD – Monitoring Ref: GLD-V1



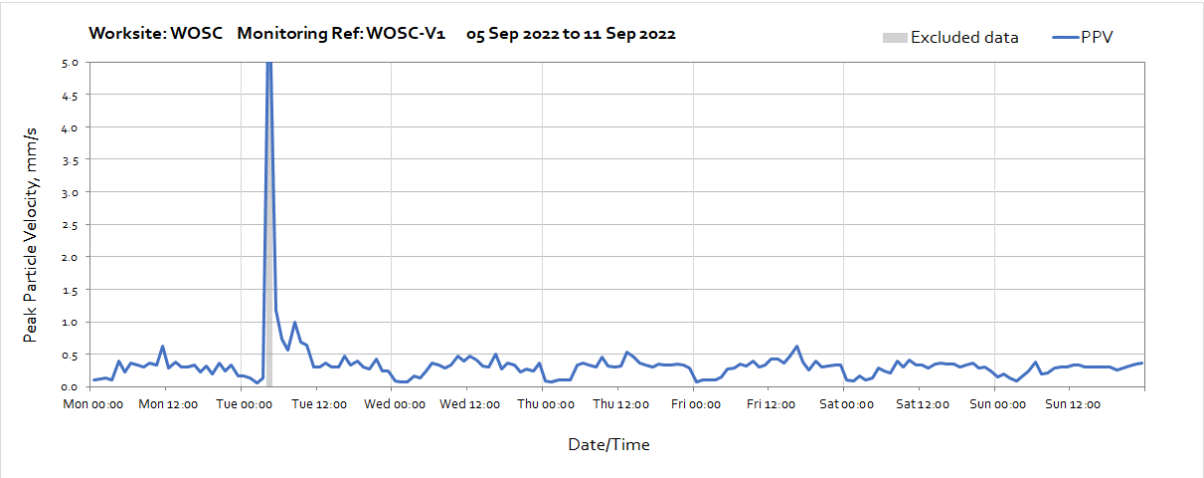

Worksite: GLD Monitoring Ref: GLD-V1 05 Sep 2022 to 11 Sep 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

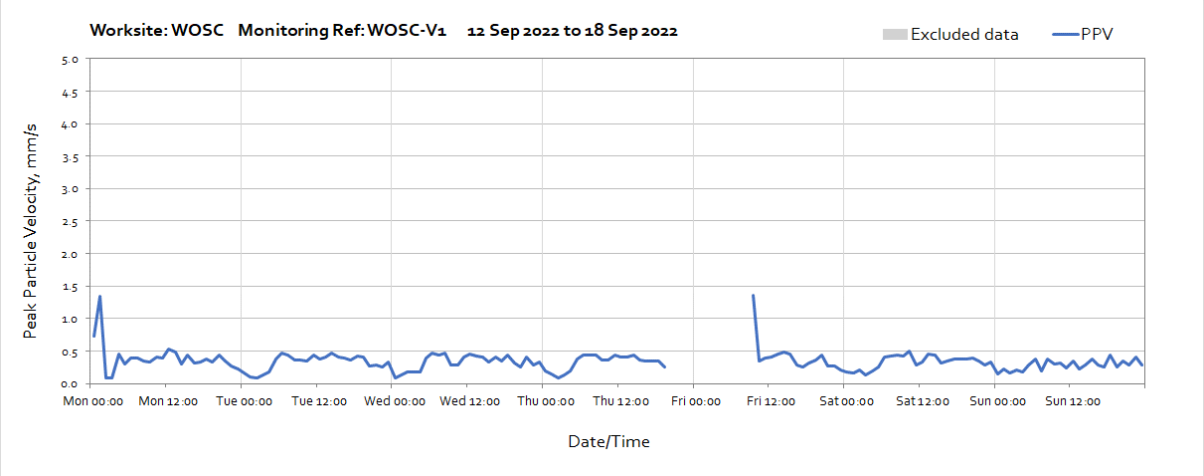

Worksite: GLD Monitoring Ref: GLD-V1 12 Sep 2022 to 18 Sep 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: GLD Monitoring Ref: GLD-V1 19 Sep 2022 to 25 Sep 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

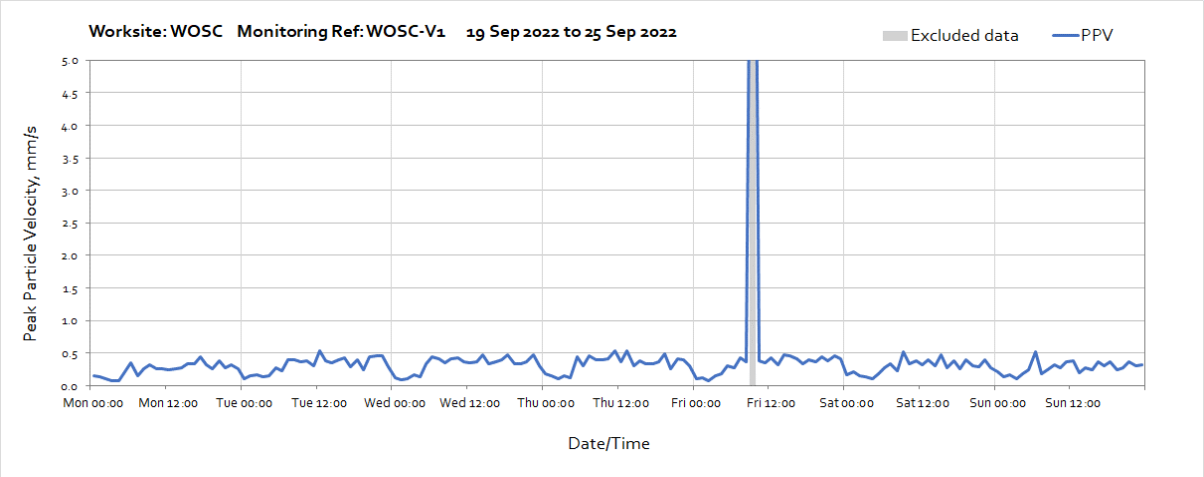


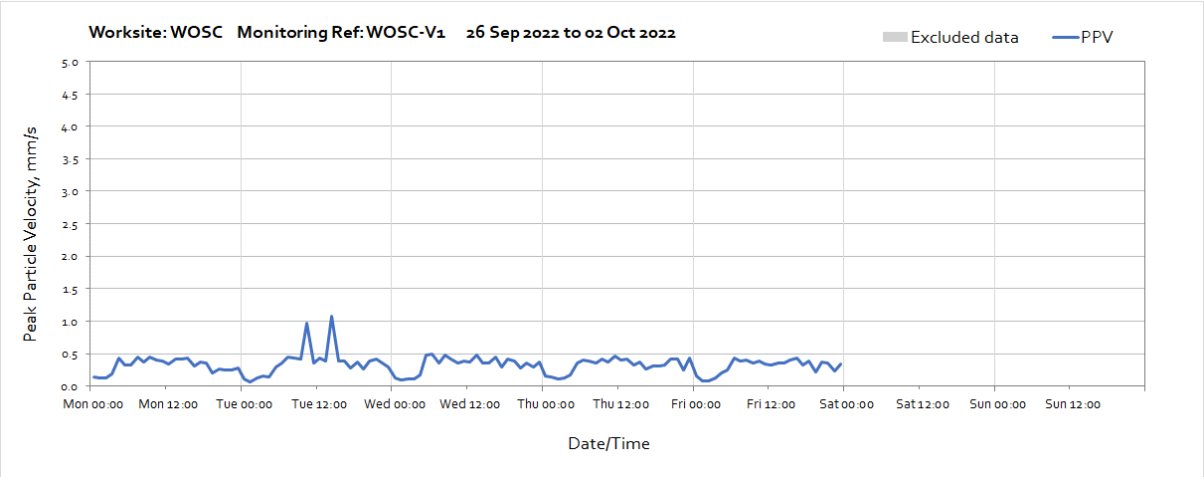
Worksite: WOSC – Monitoring Ref: WOSC-V1



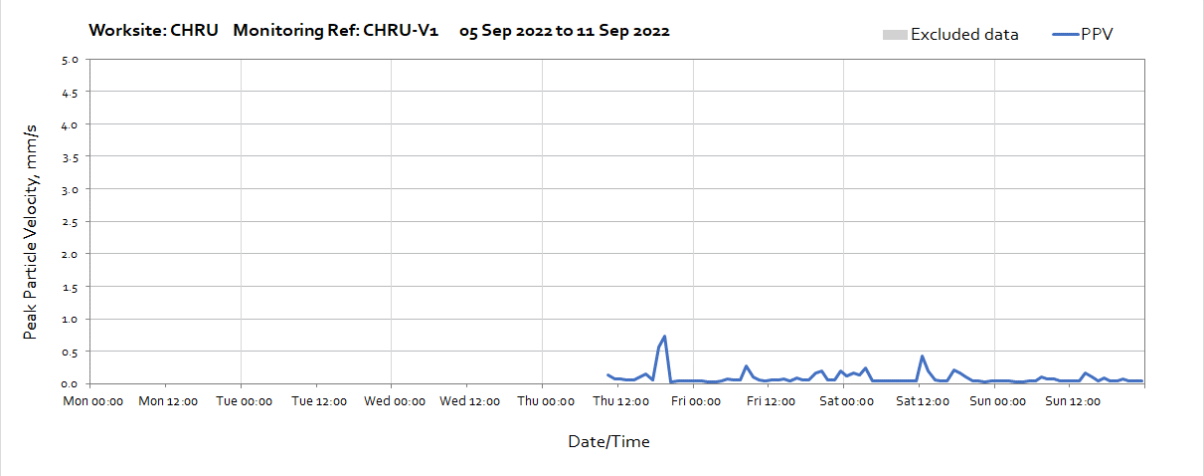


Note: Missing data between 20:00 on Thursday 15th September and 09:00 on Friday 16th September was due to loss of power at the monitoring station the cause of which is currently under investigation.

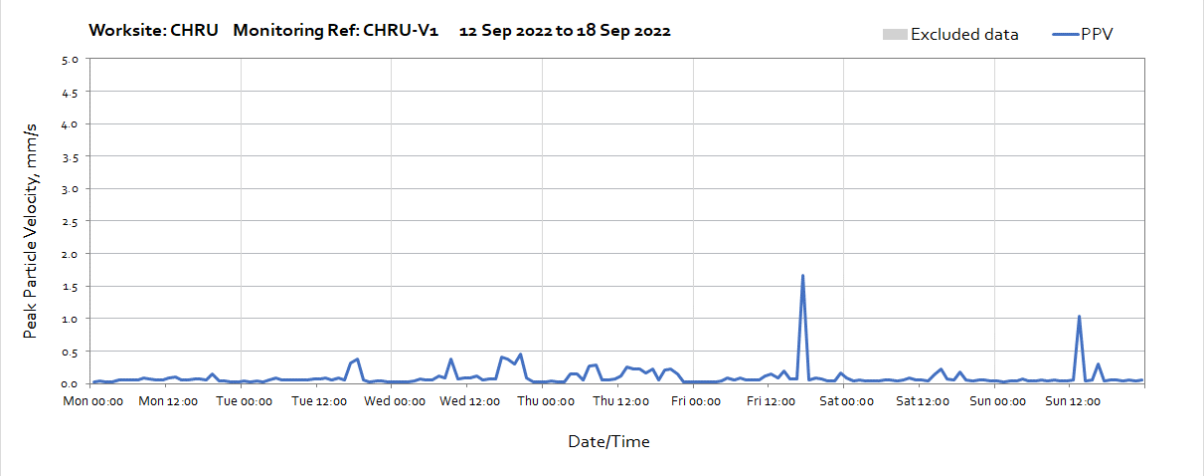


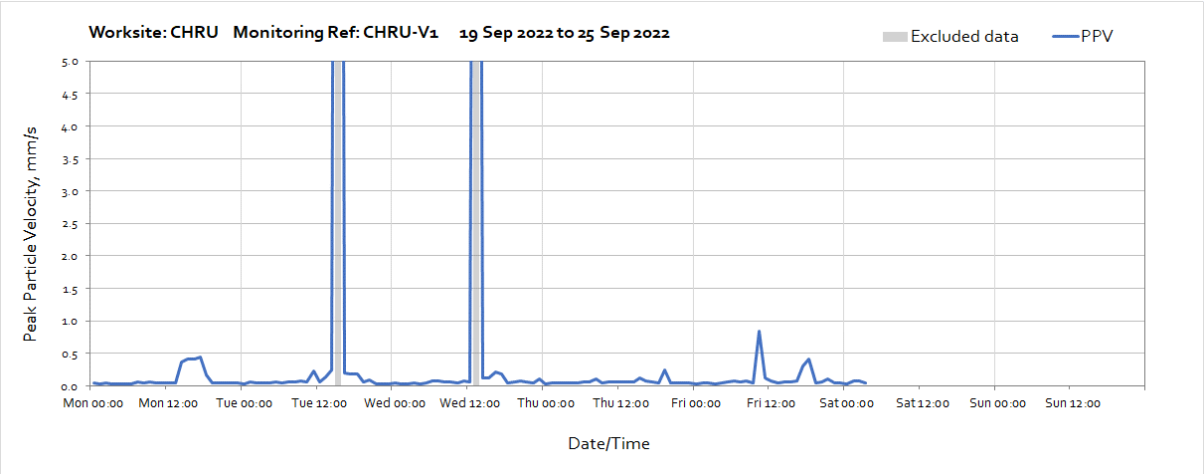


Worksite: CHR – Monitoring Ref: CHRU-V1



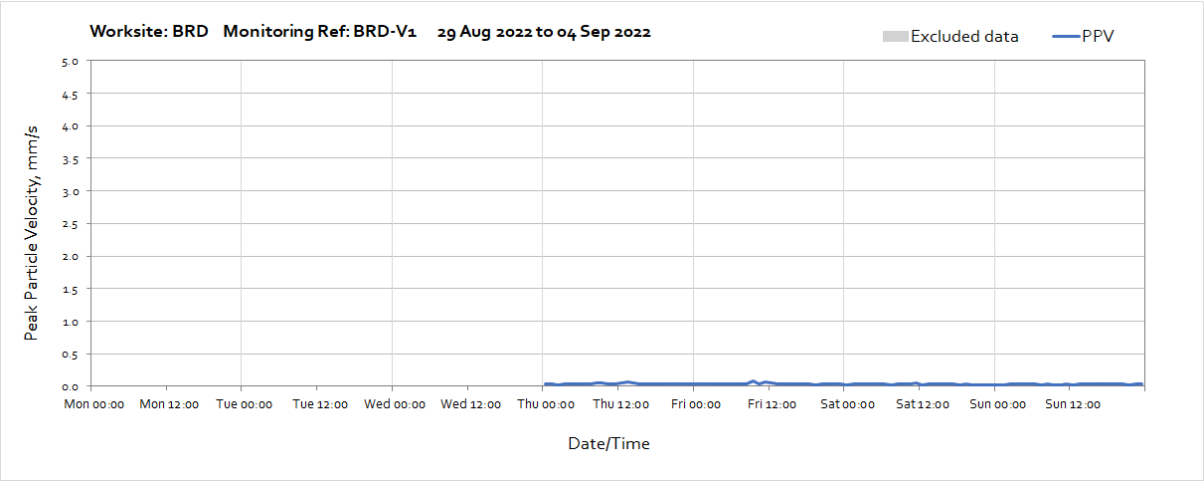
Note: Noise monitor installed at 10:00 on Thursday 8th September 2022.

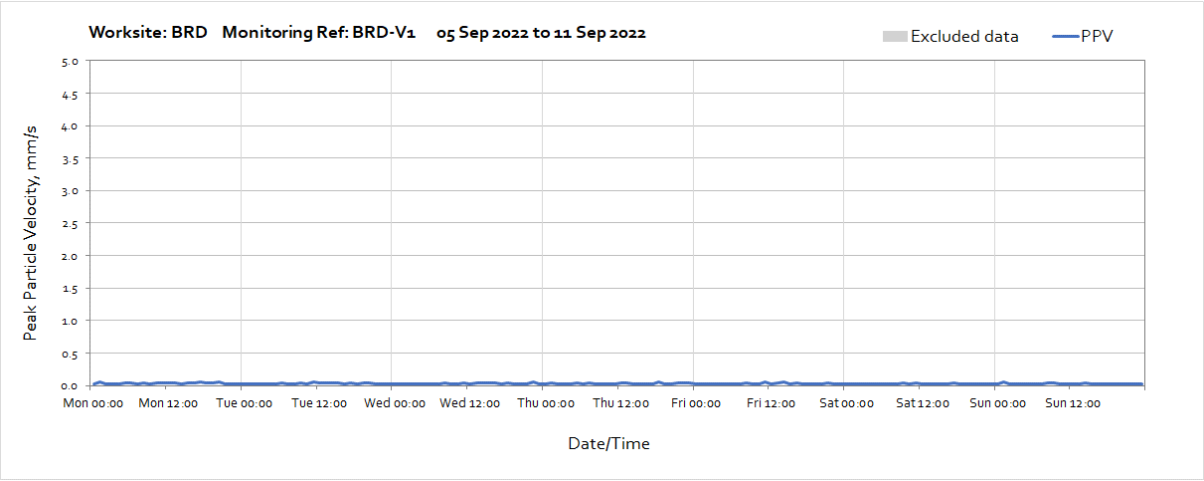


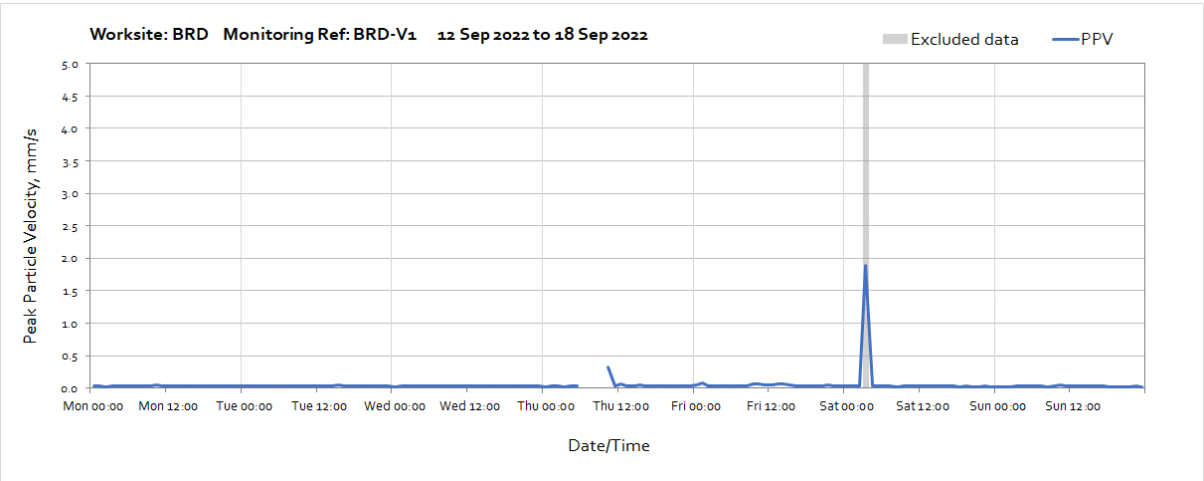


Note: Missing data from 04:00 on Saturday 24th September 2022 to the end of the month was due to loss of power to battery caused by the theft of solar panels.

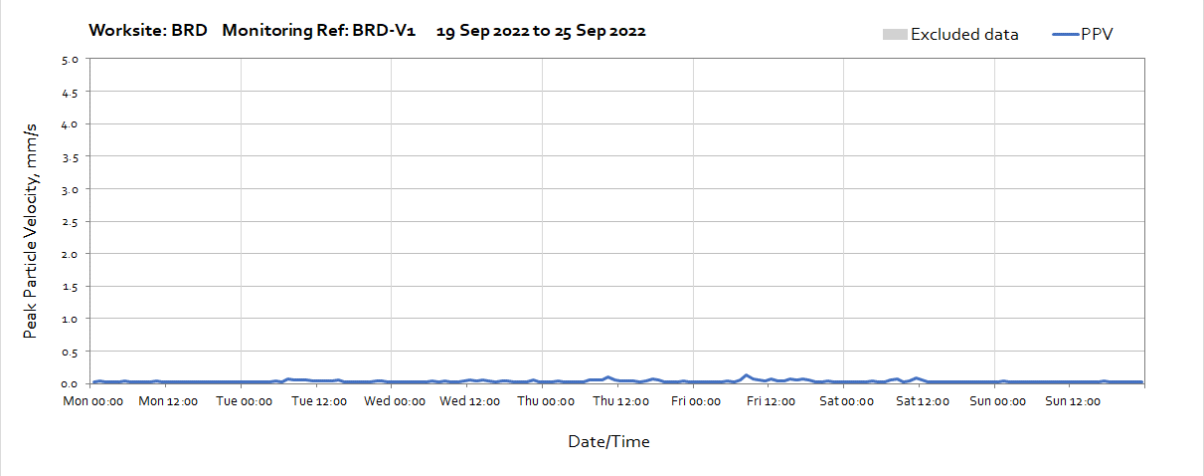
Worksite: BRD – Monitoring Ref: BRD-V1

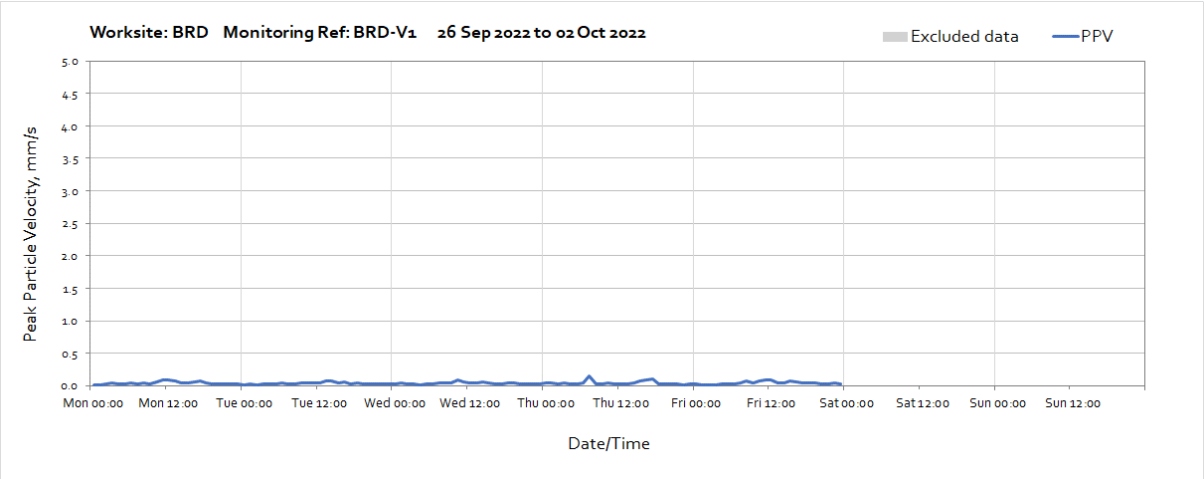






Note: Missing data between 06:00 and 10:00 on Thursday 15th September was due to loss of power as access restrictions delayed maintenance of the monitor.


Worksite: BRD Monitoring Ref: BRD-V1 19 Sep 2022 to 25 Sep 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: BRD Monitoring Ref: BRD-V1 26 Sep 2022 to 02 Oct 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time