

Construction Noise and Vibration Monthly Report – March 2023

Solihull Metropolitan 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 the Solihull Metropolitan Borough Council (SMBC) during the month of March 2023.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken at the Coleshill Heath Road worksite (ref.: CHR), where work activities included installation of rigid inclusions, duct installation, excavation, topsoil stripping, geotextile placing, trench works and bore piling works.
- Noise monitoring was undertaken at the Packington Embankment worksite (ref.: PE), where work activities included utility works, duct installation, excavation, backfilling, laying and compaction works, parapets backfilling, vegetation clearance and footpath works.
- Noise monitoring was undertaken at the Bickenhill Cutting worksite (ref.: BIC), where work activities included backfilling, reinforcement and formwork and installation of trench sheets.
- Noise monitoring was undertaken at the Birmingham Interchange Station worksite (ref.: BIS), where work activities included pile cropping.
- Noise monitoring was undertaken at Diddington Lane Embankment (ref.: DLE), where work activities included wall construction, piling works and cabling work.
- Noise monitoring was undertaken in the vicinity of the Blythe Bypass Embankment Worksite (ref.: BBE), where topsoil stripping was undertaken.
- Noise monitoring was undertaken in the vicinity of the A452 compound (ref.: A452), where work activities included topsoil stripping, set up of bentonite plant and plant movements.
- Noise monitoring was undertaken in the vicinity of the Park Lane Worksite (ref.: PL) where work activities included vehicle movements, material haulage and road realignment.
- Noise and Vibration monitoring was undertaken in the vicinity of the Balsall Common Viaduct Worksite (ref.: BCV) where work activities included extension of working platform.

- Noise monitoring was undertaken in the vicinity of the Carol Green Rail Underbridge Worksite (ref.: CGRU), where work activities included concrete pile works, vehicle movements and material haulage.
- Noise and vibration monitoring were undertaken in the vicinity of the Waste Lane Overbridge and Satellite Worksite (ref.: WLOS), where no construction works were carried out.

Further works, where monitoring did not take place, were also undertaken as part of the utilities diversion between Meriden Road & Diddington Lane.

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 on one (1) occasion due to HS2 works during March 2023.

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

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 (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 Solihull Metropolitan District (SMBC) for the period 1st to 31st March 2023.

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

- Coleshill Heath Road worksite, ref.: CHR (see Plan 1 in Appendix A), where works activities included:
 - Installation of rigid inclusions.
 - Duct installation including backfilling.
 - Excavation.
 - Trench works.
 - Geotextile placing.
 - Bore piling.
 - Topsoil strip.

- Packington Embankment worksite, ref.: PE (see Plan 2 in Appendix A), where works activities included:
 - Utility works.
 - Duct installation.
 - Excavation.
 - Backfilling.
 - Laying and compaction works.
 - Vegetation clearance.
 - Parapets backfilling.
 - Footpath works.
- Bickenhill Cutting worksite, ref.: BIC (see Plan 3 in Appendix A), where works activities included:
 - Backfilling.
 - Reinforcement and formwork.
 - Installation of trench sheets.
- Birmingham Interchange Station worksite, ref.: BIS (see Plan 3 in Appendix A), where works activities included:
 - Pile cropping.
- Diddington Lane Embankment worksite: ref.: DLE (see Plan 3 in Appendix A), where works activities included:
 - Wall construction.
 - Piling works.
 - Cabling work.

- Blythe Bypass Embankment worksite, reference - BBE (see plan 4 in Appendix A), where works activities included:
 - Topsoil stripping.
- A452 worksite, reference - A452 (see plan 5 in Appendix A), where work activities included:
 - Topsoil stripping.
 - Plant movements.
 - Set up of bentonite plant.
- Park Lane worksite, reference - PL (see plan 6 in Appendix A), where work activities included:
 - Vehicle movements.
 - Material haulage.
 - Road realignment.
- Balsall Common Viaduct worksite, reference - BCV (see plan 7 in Appendix A), where work activities included:
 - Extension of working platform.
- Carol Green Rail Underbridge worksite, reference - CGRU (see plan 7 in Appendix A), where work activities included:
 - Concrete pile works, including breaking and removal works.
 - Vehicle movements.
 - Material haulage.
- Waste Lane Overbridge and Satellite worksite, reference WLOS (see plan 8 in Appendix A), where no construction works were undertaken.

1.1.4 Further works, where monitoring did not take place, were also undertaken as part of the utilities diversion between Meriden road & Diddington Lane.

1.1.5 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

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<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 Twenty (20) noise and seven (7) vibration monitoring installations were active in March in the SMBC area. Table 2 summarises the position of noise and vibration monitoring installations within the SMBC area in March 2023.
- 1.2.2 Noise and vibration levels were not measured in March 2023 at monitoring location ref: CHRU-N1-V1 due to loss of power caused by the theft of solar panels.
- 1.2.3 Noise monitor, ref.: CGRU-3, was installed at worksite ref.: CGRU on Tuesday 14th March 2023.
- 1.2.4 Vibration monitor, ref.: PL-V4, was installed at worksite ref.: PL on Thursday 30th March 2023.
- 1.2.5 Maps showing the position of noise monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
CHR	CHR-1	Coleshill Heath Road, Coleshill Heath, Solihull
	CHRU-1	276 Yorkminster Drive, Birmingham
	CHRU-V1	276 Yorkminster Drive, Birmingham
PE	PE-1	Common Farm, Chester Road, Coleshill, Birmingham
BIC	BIC-1	Park Farm Barns, Chester Rd, Marston Green, Coventry
BIS	BIS-1	Hollywell Brook, Middle Bickenhill Lane, Solihull
DLE	DLE-1	Hampton Hill Hounds, Nursery Cottage, Coventry Road, Bickenhill
	DLE-2	Diddington Ln, Hampton in Arden
BBE	BBE-1	Patrick Farm House, Meriden Road, Hampton in Arden
A452	A452-1	Marsh House Farm, Brandocks Marsh, Solihull
	A452-V1	Final Home, Park Lane, Balsall Common
PL	PL-1	Park Lane, Balsall Common, Solihull

Worksite Reference	Measurement Reference	Address
	PL-2	The Laurel, Lavender Hall Lane, Balsall Common, Solihull
	PL-3	Holly Acre Lodge, Kenilworth Road, Solihull
	PL-5	Lavender Hall Lane, Balsall Common, Solihull
	PL-V1	(east of) Final Home, Park Lane, Balsall Common, Coventry, West Midlands
	PL-V3	Lavender Hall Lane, Balsall Common, Solihull
	PL-V4	(north-east of) Holly Acre Lodge, Kenilworth Road, Berkswell, Solihull
BCV	BCV-1	Cherry Tree Cottage, Truggist Lane, Balsall Common, Solihull
CGRU	CGRU-1	The Stables, Truggist Lane, Balsall Common, Solihull
	CGRU-2	Berkswell-House, Truggist Lane, Balsall Common, Solihull
	CGRU-3	Annora House, 314 Station Rd, Balsall Common
WLOS	WLOS-1	19 Hodgetts Lane, Burton Green, Warwickshire
	WLOS-2	Little Beanitt Farm, Waste Lane, Balsall Common, Solihull
	WLOS-3	Dragonflies, Waste Lane, Balsall Common, Solihull
	WLOS-V1	19 Hodgetts Lane, Burton Green, Warwickshire
	WLOS-V2	Little Beanitt Farm, Waste Lane, Balsall Common, Solihull

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 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
CHR	CHR-1	Coleshill Heath Road, Coleshill Heath, Solihull	Free-field	66.0 (68.3)	65.5 (67.5)	64.8 (66.6)	61.6 (65.9)	59.1 (67.7)	62.5 (62.9)	63.6 (64.0)	63.9 (64.9)	63.5 (66.1)	56.9 (61.3)	63.4 (66.8)	58.9 (66.5)
	CHRU-1	276 Yorkminster Drive, Birmingham	Free-field	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
PE	PE-1	Common Farm, Chester Road, Coleshill	Free-field	58.8 (61.6)	59.1 (62.2)	57.7 (60.2)	57.0 (60.8)	55.3 (62.2)	55.7 (60.2)	56.6 (61.2)	56.4 (60.7)	55.8 (60.7)	51.5 (56.8)	56.8 (60.2)	54.3 (63.0)
BIC	BIC-1	Park Farm Barns, Chester Rd, Marston Green	Free-field	58.6 (62.7)	57.7 (60.4)	56.5 (60.1)	55.4 (58.4)	53.3 (62.2)	54.8 (57.3)	55.1 (58.5)	55.1 (57.3)	53.9 (57.4)	50.1 (57.1)	54.5 (57.9)	52.7 (61.2)
BIS	BIS-1	Hollywell Brook, Middle Bickenhill Lane, Solihull	Free-field	56.3 (59.9)	56.1 (60.5)	55.2 (58.7)	54.1 (58.3)	51.8 (60.6)	52.6 (58.2)	53.4 (59.0)	53.6 (58.0)	53.8 (58.1)	49.7 (57.0)	54.4 (58.4)	52.7 (61.5)
DLE	DLE-1	Hampton Hill Hounds, Nursery Cottage, Coventry Road	Free-field	56.1 (61.5)	55.2 (59.2)	54.3 (64.8)	51.7 (59.4)	50.1 (60.0)	55.8 (65.3)	54.3 (57.0)	51.1 (55.1)	52.5 (57.4)	48.4 (54.6)	54.6 (60.8)	49.6 (55.8)
	DLE-2	Diddington Ln, Hampton in Arden, Solihull	Free-field	52.7 (55.5)	53.4 (64.2)	50.3 (56.8)	48.7 (53.1)	46.4 (55.2)	49.6 (52.6)	50.0 (51.5)	49.6 (50.5)	48.1 (52.2)	44.1 (52.0)	49.2 (53.6)	46.2 (54.5)

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
BBE	BBE-1	Patrick Farm House	Free-field	56.1 (57.6)	55.9 (59.1)	55.0 (57.5)	52.5 (55.8)	48.7 (56.6)	52.8 (54.9)	53.5 (54.2)	53.3 (53.7)	52.5 (54.7)	46.6 (51.6)	52.4 (55.5)	47.8 (55.5)
A452	A452-1	Marsh House Farm	Free-field	55.0 (58.4)	56.5 (59.3)	53.4 (59.7)	50.4 (56.5)	46.7 (56.0)	49.4 (51.7)	51.1 (52.2)	49.8 (52.2)	50.9 (58.0)	44.0 (50.3)	49.7 (55.9)	46.7 (54.5)
PL	PL-1	Park Lane	Free-field	55.0 (57.0)	59.2 (64.9)	53.0 (61.7)	48.9 (53.1)	46.3 (54.5)	52.2 (55.1)	52.9 (55.1)	48.7 (52.7)	48.1 (52.7)	42.5 (49.2)	48.0 (54.7)	44.8 (52.3)
	PL-2	The Laurel	Free-field	50.5 (52.8)	55.4 (66.1)	50.9 (55.7)	49.0 (52.5)	44.1 (51.9)	47.9 (48.9)	50.2 (51.3)	49.1 (51.0)	48.4 (52.3)	40.4 (45.2)	48.1 (53.6)	42.6 (48.5)
	PL-3	Holly Acre Lodge	Free-field	58.1 (61.8)	57.5 (61.6)	56.7 (61.3)	53.6 (59.3)	49.8 (59.3)	51.8 (54.3)	54.4 (56.4)	54.2 (57.5)	53.5 (58.2)	46.9 (52.0)	52.6 (57.9)	49.2 (57.6)
	PL-5	Lavender Hall Lane	Free-field	62.2 (64.3)	64.2 (65.9)	63.4 (65.3)	60.5 (63.8)	54.6 (61.2)	58.0 (58.8)	62.5 (62.9)	62.2 (62.5)	61.1 (63.7)	53.5 (58.9)	60.8 (63.6)	53.9 (60.6)
BCV	BCV-1	Cherry Tree Cottage	Free-field	52.1 (53.4)	56.5 (63.8)	52.5 (56.0)	50.6 (54.4)	47.7 (53.2)	50.1 (51.3)	51.3 (52.4)	50.6 (51.9)	50.6 (53.2)	45.7 (51.6)	50.3 (56.7)	48.5 (56.8)
CGRU	CGRU-1	The Stables	Free-field	53.0 (58.5)	59.8 (64.0)	50.9 (56.8)	49.6 (54.2)	47.6 (55.6)	49.1 (52.4)	51.9 (54.2)	50.7 (52.8)	50.3 (54.9)	44.5 (51.4)	52.5 (69.8)	49.7 (58.2)
	CGRU-2	Berkswell-House	Free-field	54.2 (56.1)	61.4 (68.1)	54.9 (65.7)	53.3 (56.6)	50.5 (56.4)	52.2 (55.3)	57.1 (58.4)	53.4 (54.0)	53.0 (56.1)	46.7 (55.0)	52.9 (57.4)	51.6 (58.8)

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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
	CGRU-3	Annora House, 314 Station Rd	Free-field	50.0 (51.9)	51.6 (53.1)	50.1 (51.9)	48.9 (52.9)	45.9 (50.7)	47.4 (47.9)	49.5 (49.8)	48.0 (48.3)	48.2 (51.4)	43.3 (46.9)	48.8 (51.7)	44.8 (48.8)
WLOS	WLOS-1	19 Hodgetts Lane	Façade	50.1 (58.2)	63.5 (69.7)	57.3 (69.3)	49.7 (67.6)	41.6 (53.9)	50.4 (56.0)	59.0 (64.8)	45.6 (48.5)	44.3 (49.5)	41.4 (51.2)	46.3 (53.8)	42.0 (56.5)
	WLOS-2	Waste Lane (East)	Free field	52.3 (56.0)	53.6 (56.7)	51.8 (54.9)	47.7 (54.0)	43.8 (52.7)	48.2 (49.0)	52.4 (54.7)	49.0 (50.1)	48.6 (53.0)	44.0 (52.6)	49.0 (54.8)	43.7 (55.0)
	WLOS-3	Waste Lane (West)	Free field	61.8 (64.6)	62.9 (64.4)	61.6 (64.1)	58.1 (62.2)	51.9 (60.0)	57.1 (57.3)	61.3 (61.7)	60.0 (60.7)	58.9 (62.0)	50.2 (55.8)	58.6 (63.0)	51.3 (59.8)

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
CHR	CHRU-1	276 Yorkminster Drive, Birmingham	-
A452	A452-V1	Mercote Cottage, Marsh House Farm Lane, Brandocks Marsh, Solihull	1.35 (X-axis)
PL	PL-V1	(east of) Final Home, Park Lane, Balsall Common	1.43 (X-axis)
	PL-V3	Lavender Hall Lane, Balsall Common, Solihull	0.87 (X-axis)
	PL-V4	(north-east of) Holly Acre Lodge, Kenilworth Road, Berkswell, Solihull	0.70 (X-axis)
WLOS	WLOS-V1	19 Hodgetts Lane, Burton Green, Warwickshire	0.92 (Y-axis)
	WLOS-V2	Little Beanitt Farm, Waste Lane, Berkswell, Balsall Common, Solihull	0.67 (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
Coleshill Heath Road (CHR)	CHR-1*	Coleshill Heath Road	Night	2200-0700	Not applicable**	1
Pakington Embankment (PE)	PE-1*	Common Farm	All days	All periods	Not applicable**	No exceedance
Bickenhill Cutting (BIC)	BIC-1	Park Farm Barns	All Days	All Periods	No exceedance	No exceedance
Birmingham Interchange Station (BIS)	BIS-1	Hollywell Brook, Middle Bickenhill Lane	All Days	All Periods	No exceedance	No exceedance
Diddington Lane Embankment (DLE)	DLE-1	Hampton Hill Hounds	All Days	All Periods	No exceedance	No exceedance
	DLE-2	Diddington Ln, Hampton in Arden	Weekday	0800-1800	2	No exceedance
Blythe Bypass Embankment	BBE-1*	Patrick Farm House	All Days	All Periods	No exceedance	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
A452 Compound	A452-1	Marsh House Farm	All Days	All Periods	No exceedance	No exceedance
Park Lane	PL-1*	Park Lane	Weekday	0800-1800	1	No exceedance
	PL-2*	The Laurel	Weekday	0800-1800	2	No exceedance
	PL-3*	Holly Acre Lodge	All Days	All Periods	No exceedance	No exceedance
	PL-5	Lavender Hall Lane	Weekday Saturday	0800-1800 0800-1300	21 1	No exceedance
Balsall Common Viaduct	BCV-1*	Cherry Tree Cottage	All Days	All Periods	No exceedance	No exceedance
Carol Green Rail Underbridge	CGRU-1*	The Stables	All Days	All Periods	No exceedance	No exceedance
	CGRU-2*	Berkswell-House	All Days	All Periods	No exceedance	No exceedance
	CGRU-3	Annora House, 314 Station Rd	Weekday	0800-1800	1	No exceedance
Waste Lane Overbridge and Satellite	WLOS-1*	19 Hodgetts Lane	All Days	All Periods	No exceedance	No exceedance
	WLOS-2	Waste Lane (East)	All Days	All Periods	No exceedance	No exceedance
	WLOS-3*	Waste Lane (West)	Weekday	0800-1800	10	No exceedance

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

** The LOAEL has not been assessed due to high baseline levels.

2.2.6 Thirty-eight (38) exceedances of the LOAEL were recorded at six (6) monitoring locations. The LOAEL exceedances were recorded during core working hours .

2.2.7 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
CHR	CHR-1	Coleshill Heath Road	1

2.2.8 One (1) 24-hour periods that experienced an exceedance of the SOAEL were recorded due to HS2 construction works during March 2023. Exceedances occurred at noise monitor CHR-1 during night-time periods.

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

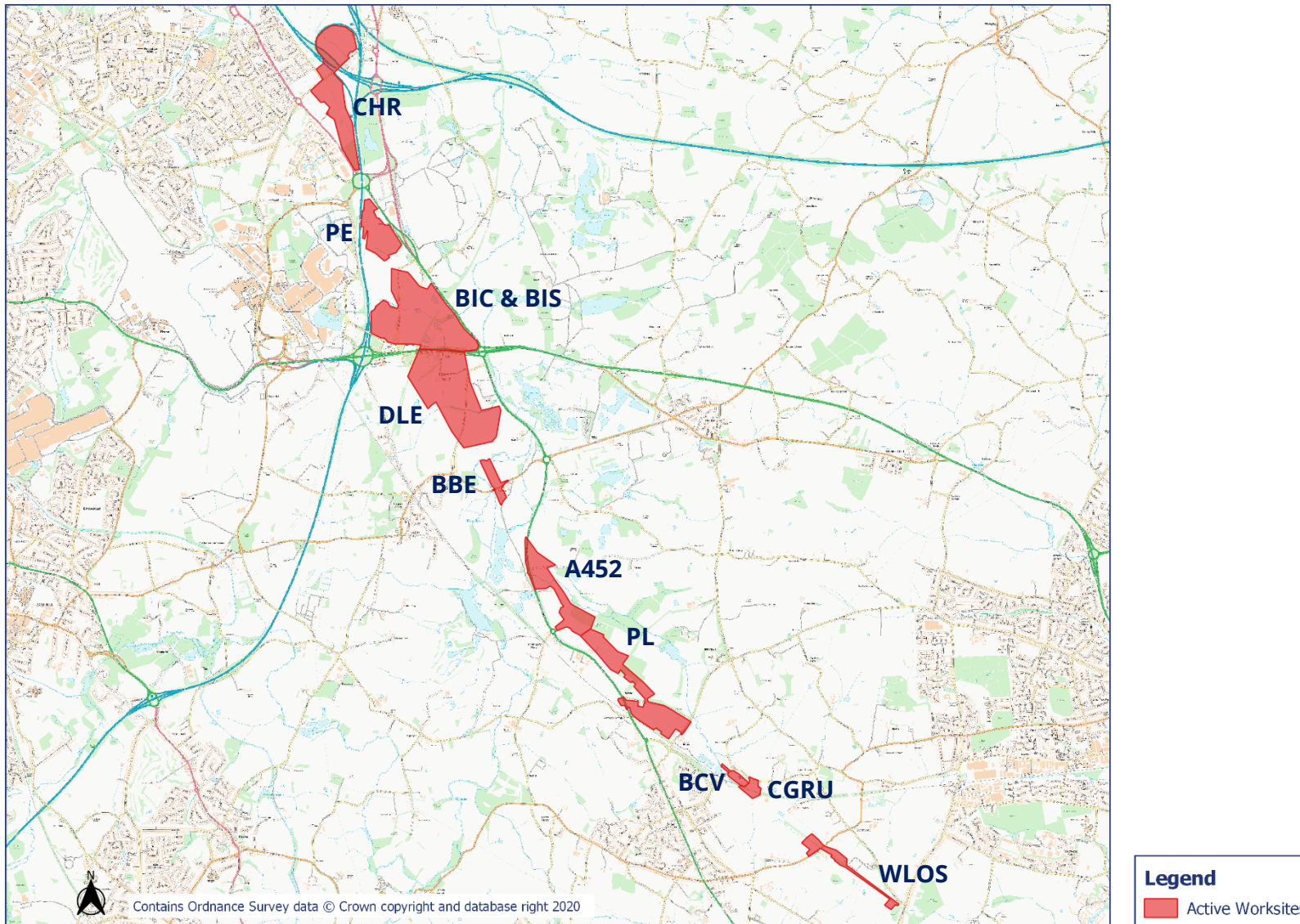
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 8: Summary of Complaints

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

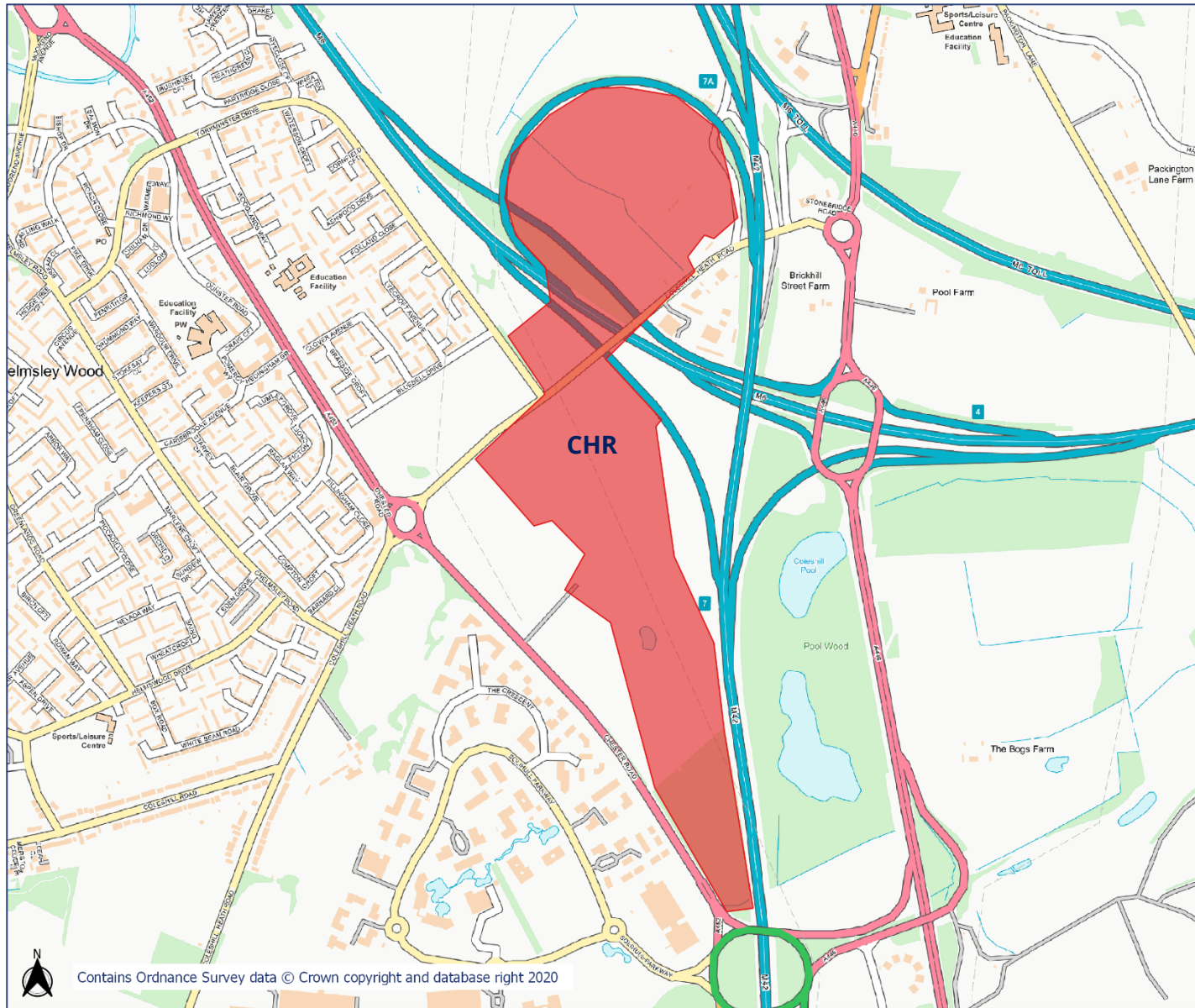
Appendix A Site Locations

Worksite Identification Plan - Overview

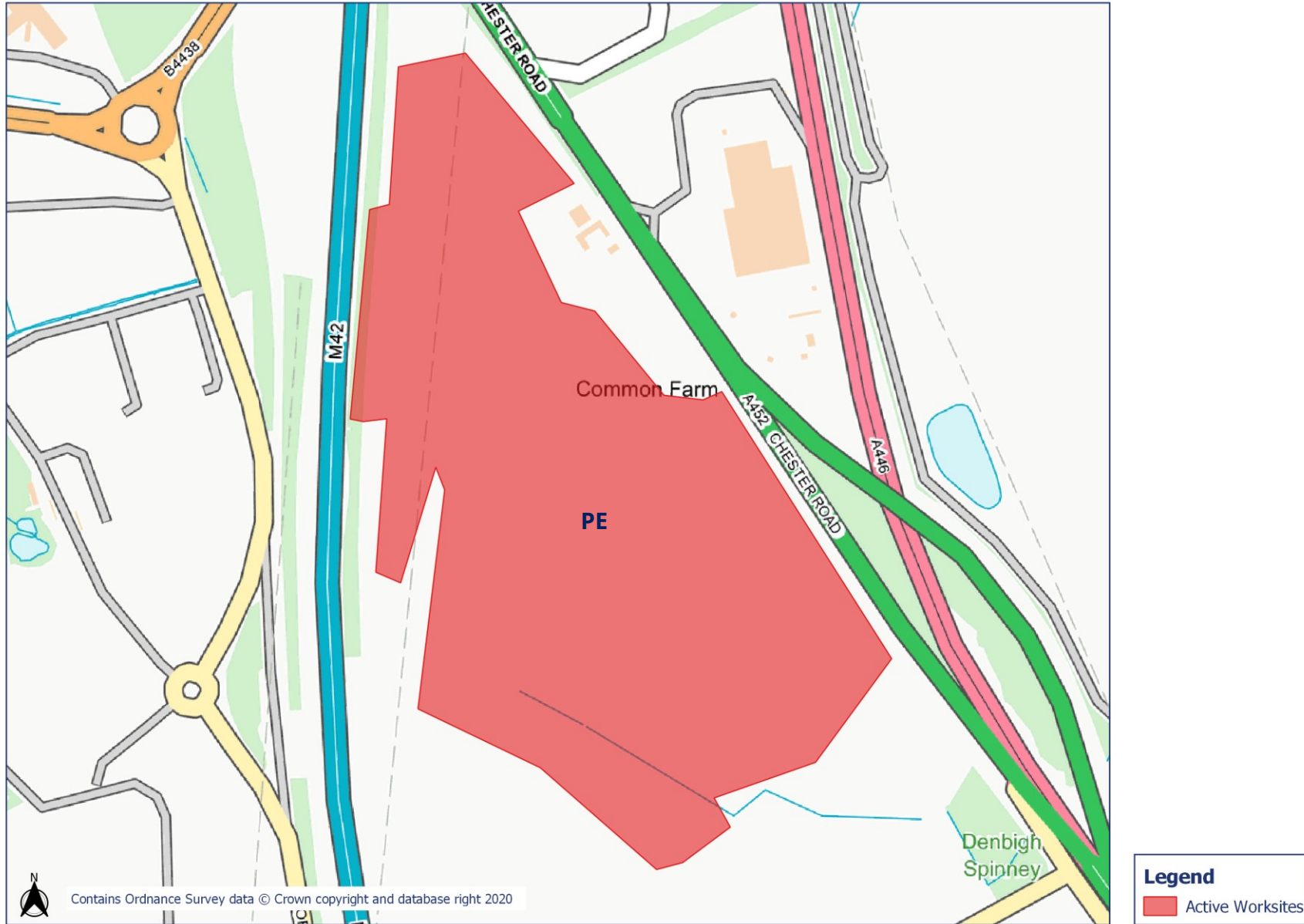


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Worksite Identification Plan - 1

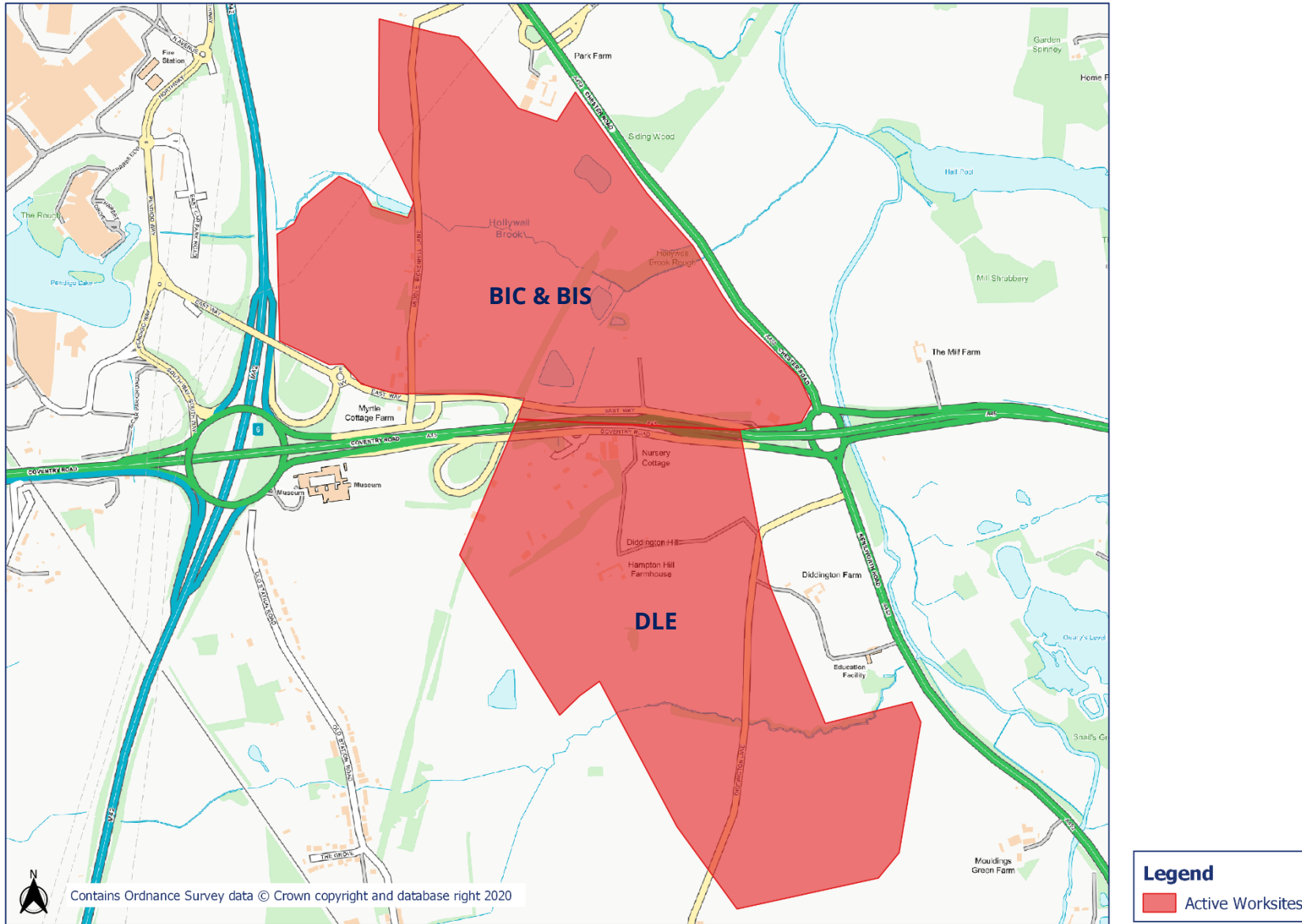


Worksite Identification Plan - 2

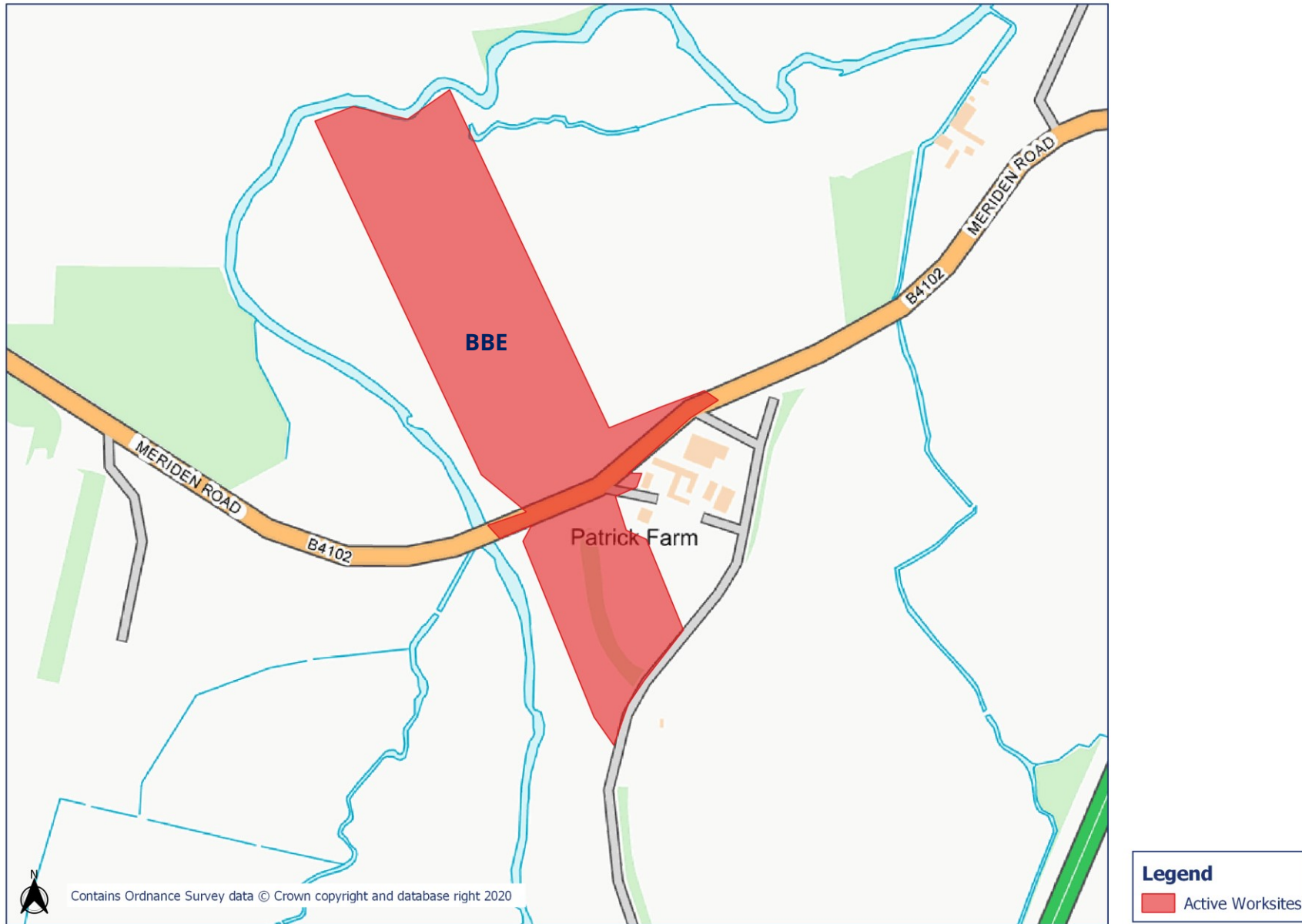


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Worksite Identification Plan - 3

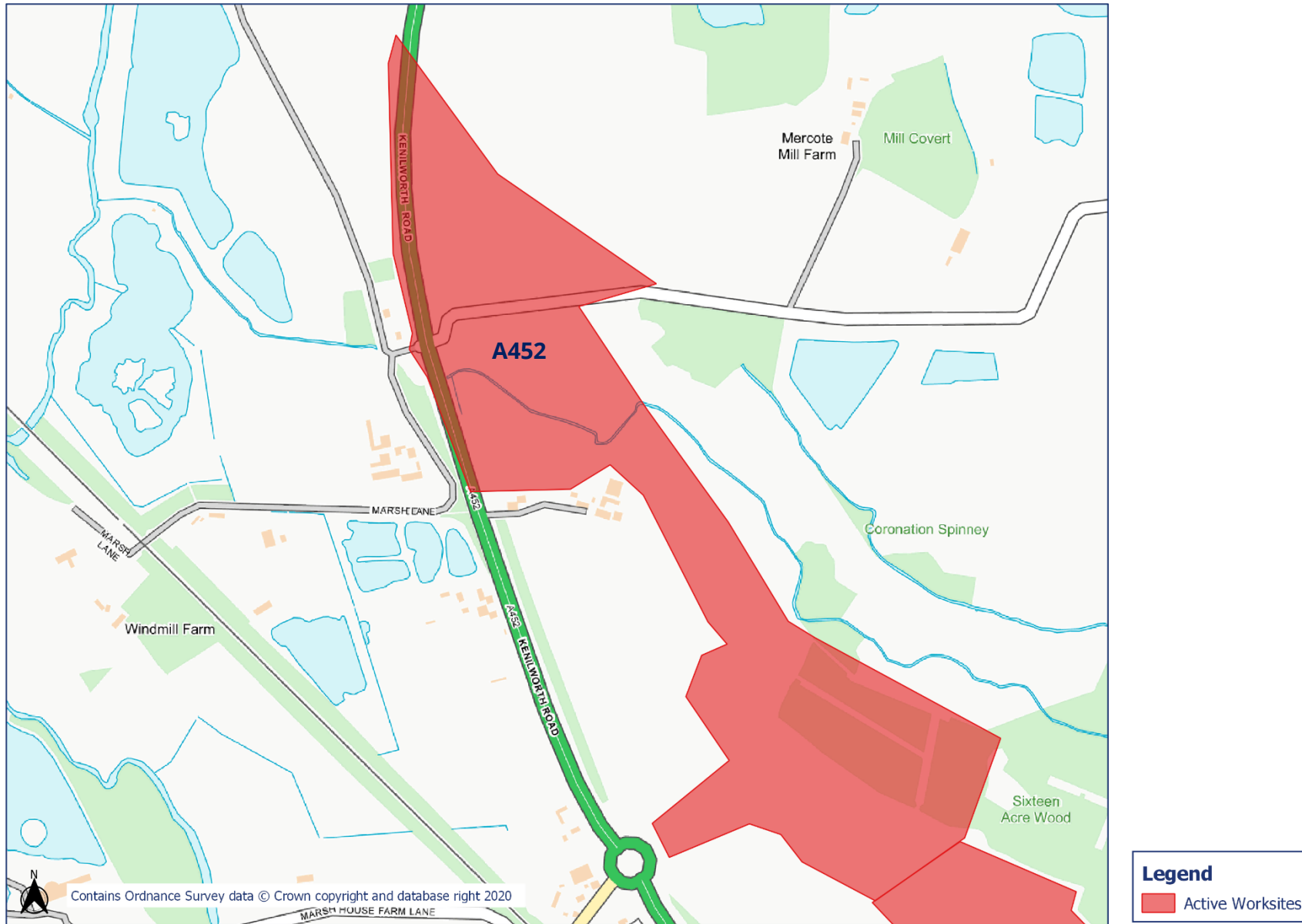


Worksite Identification Plan - 4



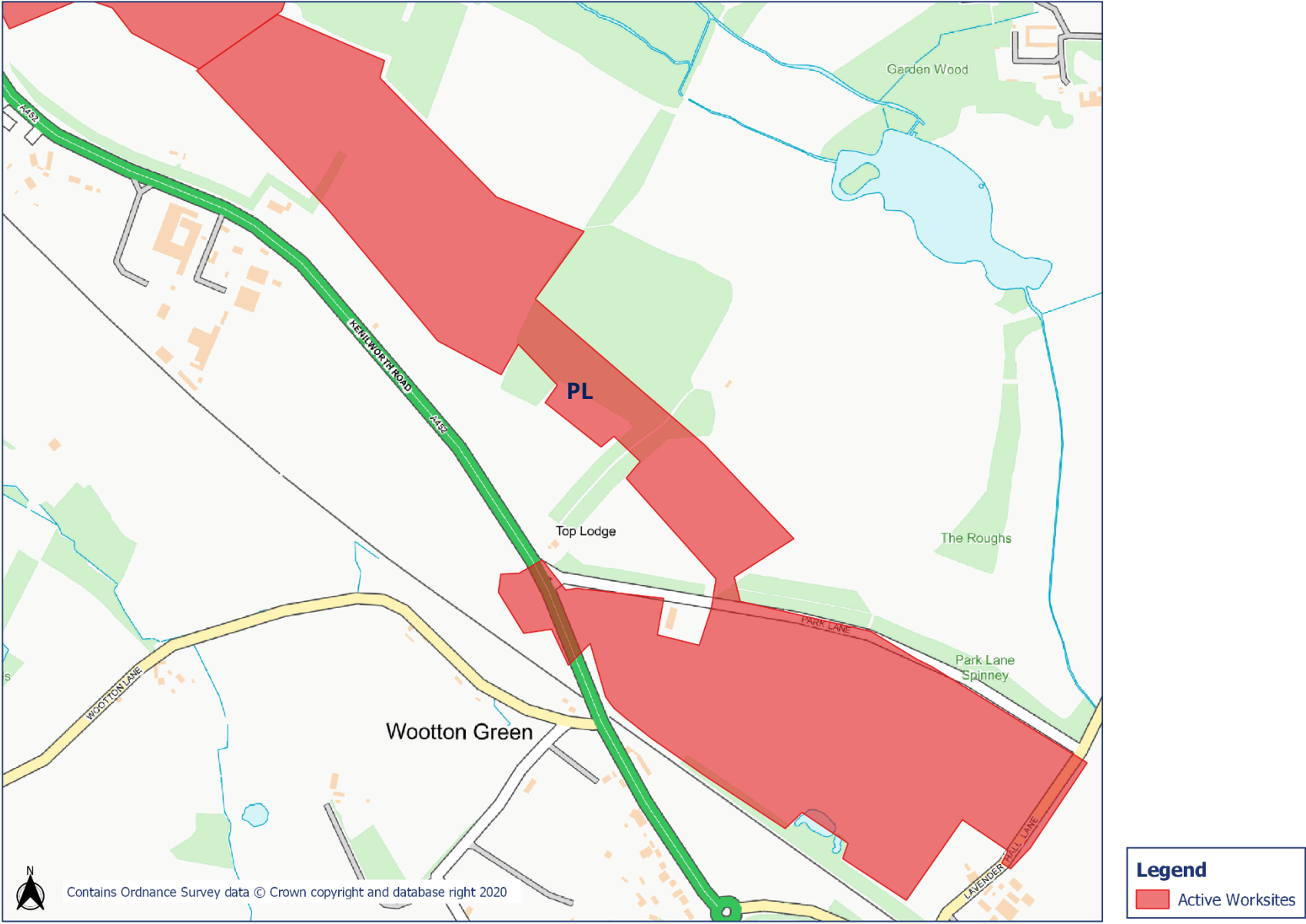
OFFICIAL

Worksite Identification Plan - 5



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Worksite Identification Plan - 6

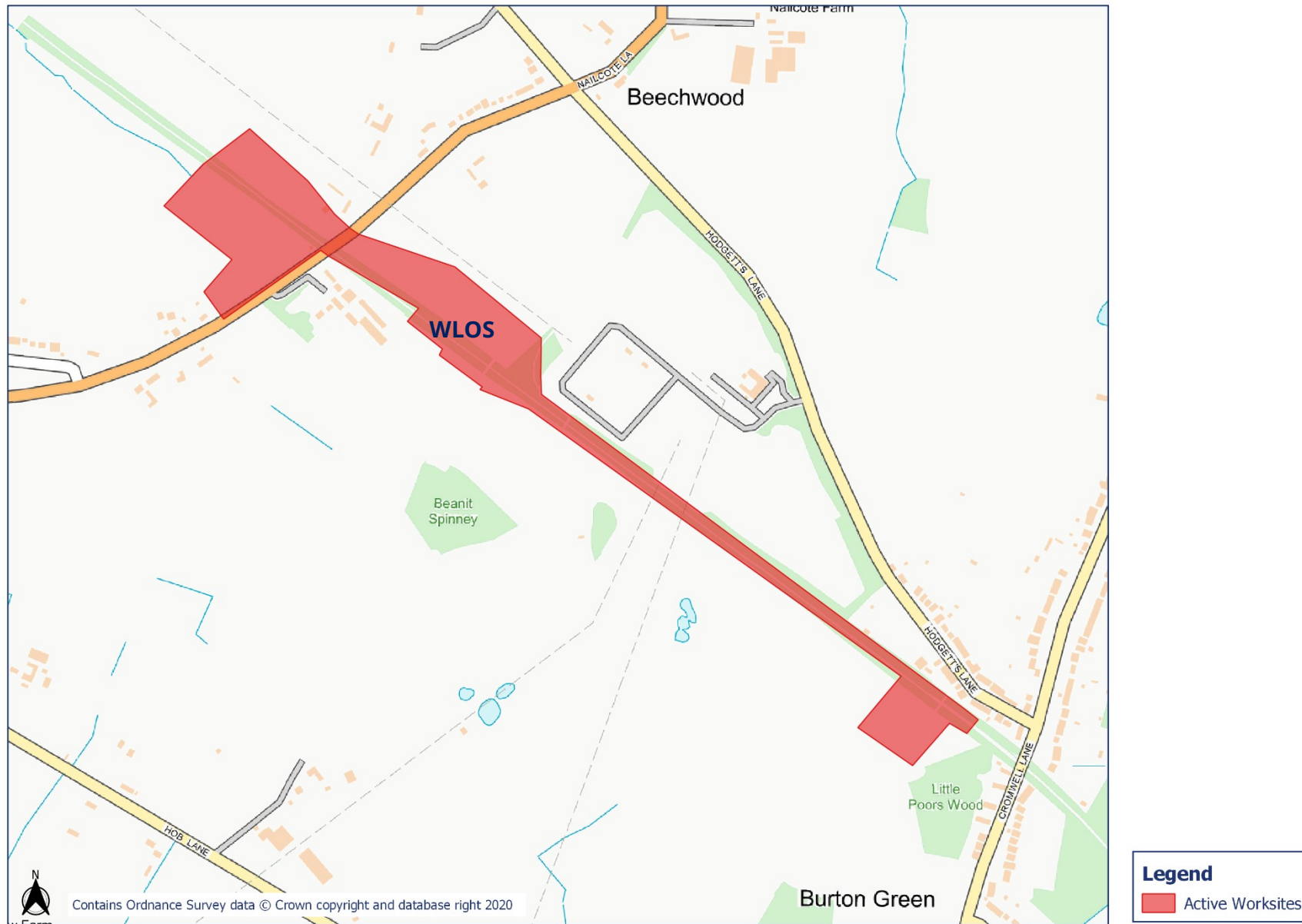


Worksite Identification Plan - 7



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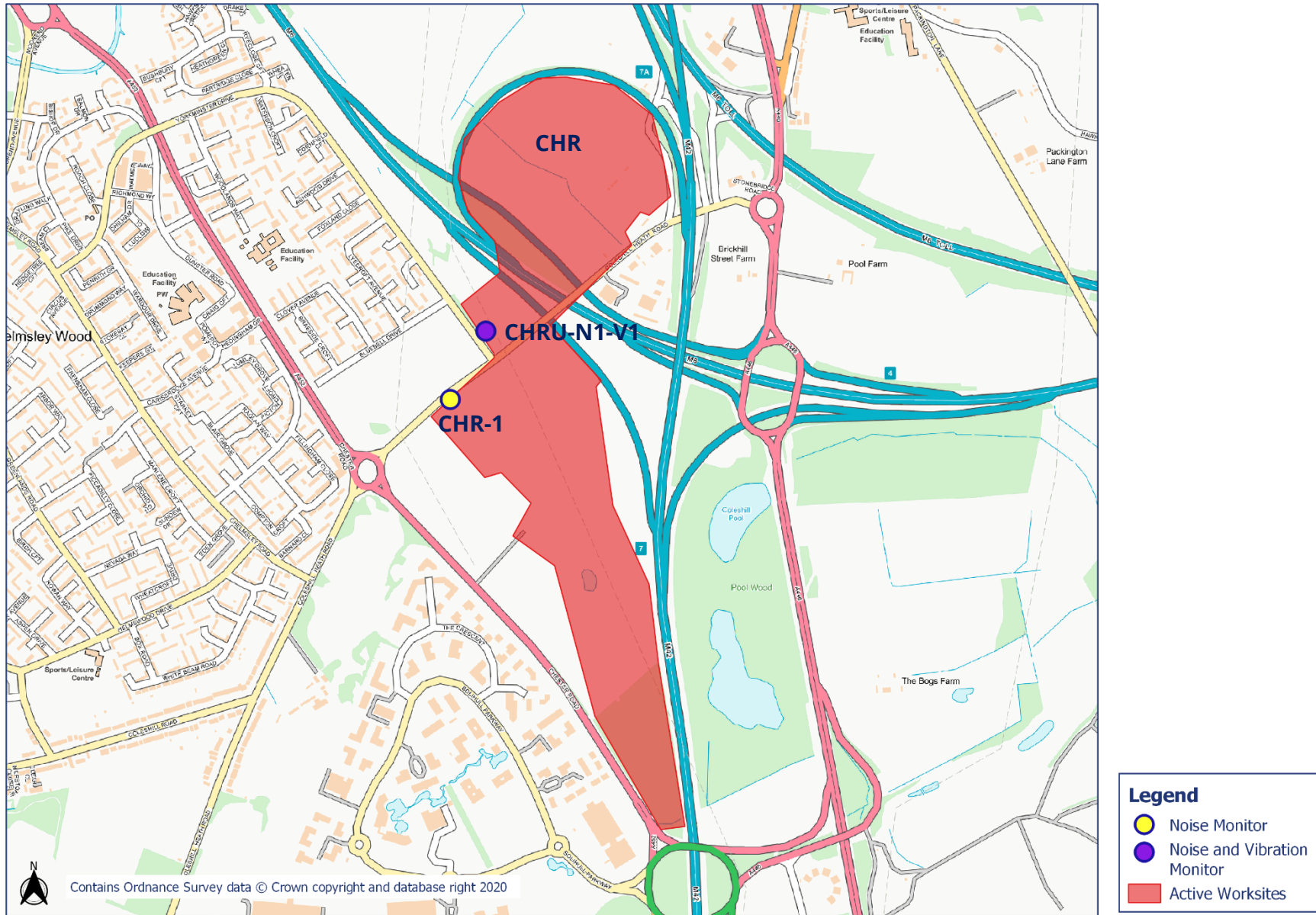
Worksite Identification Plan - 8



OFFICIAL

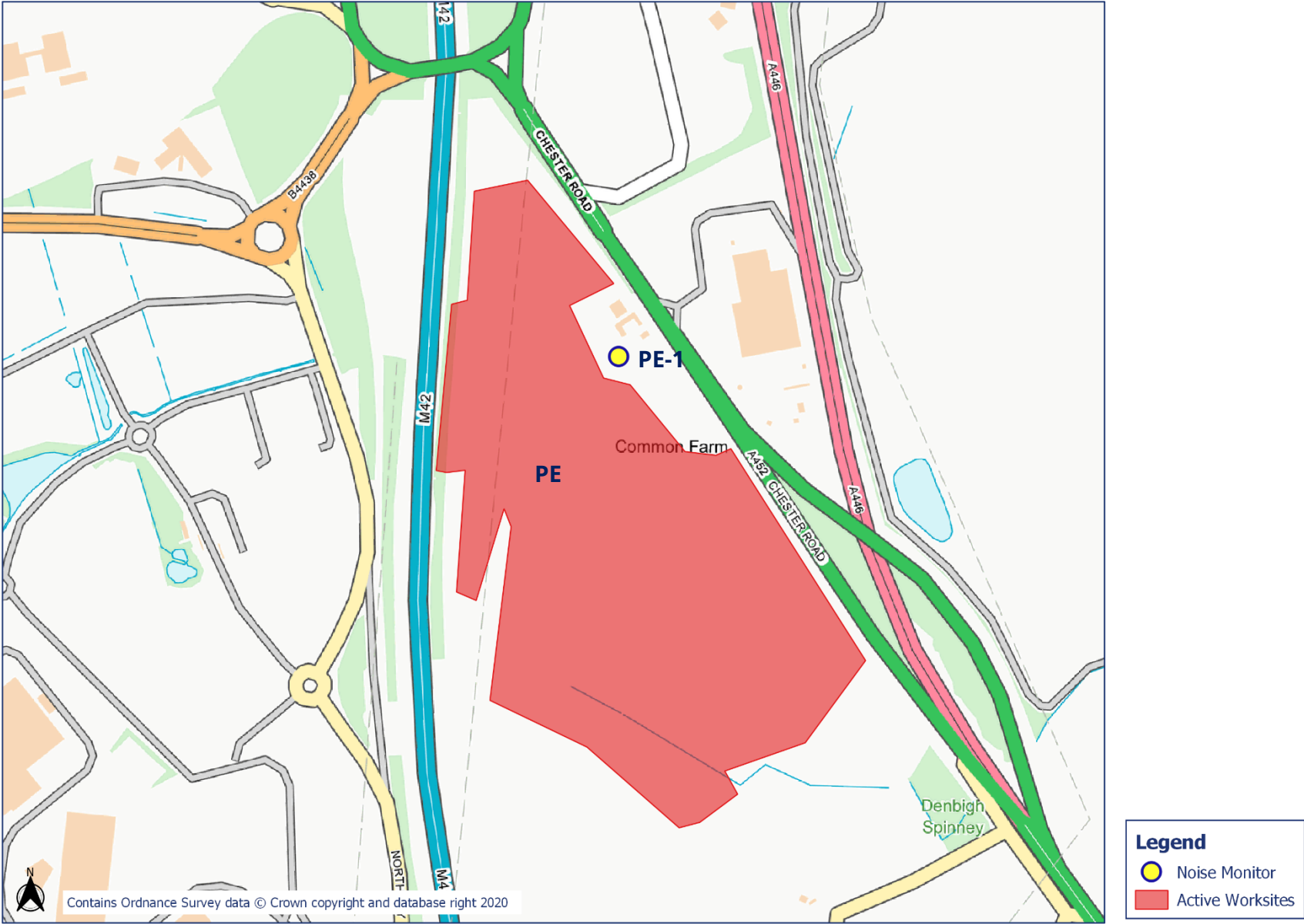
Appendix B Monitoring Locations

Noise and Vibration Monitoring Plan - 1



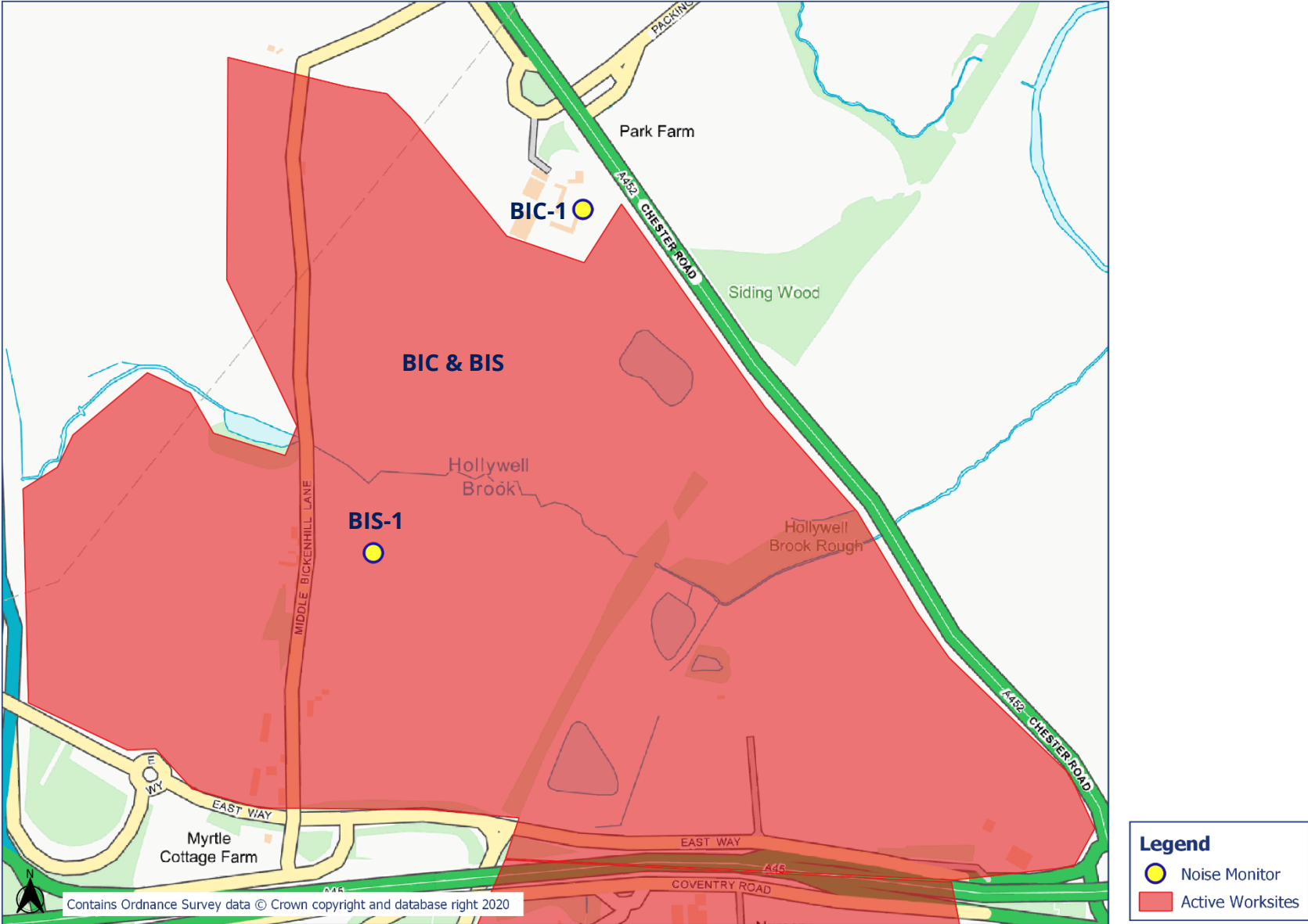
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Noise and Vibration Monitoring Plan - 2



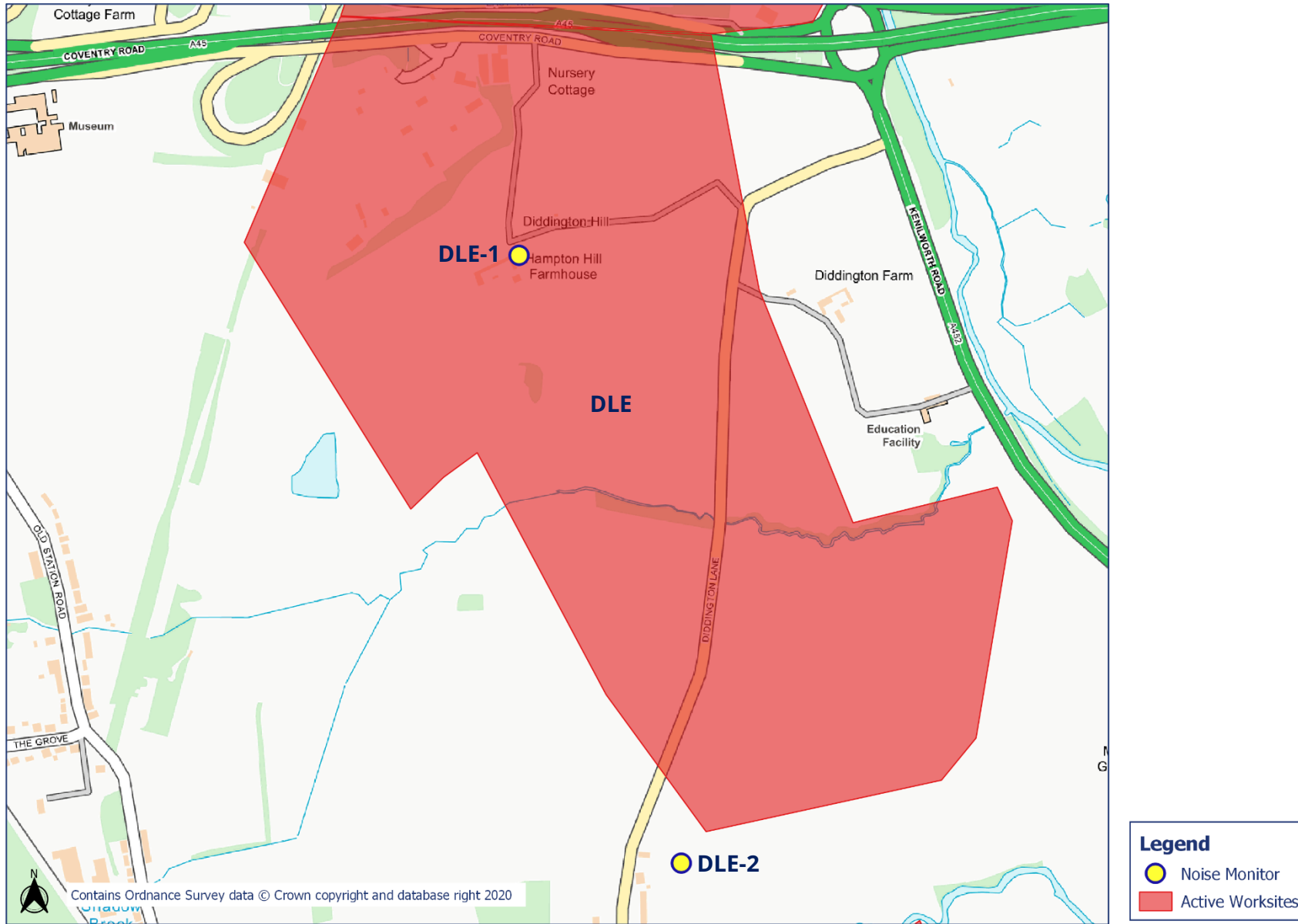
OFFICIAL

Noise and Vibration Monitoring Plan - 3



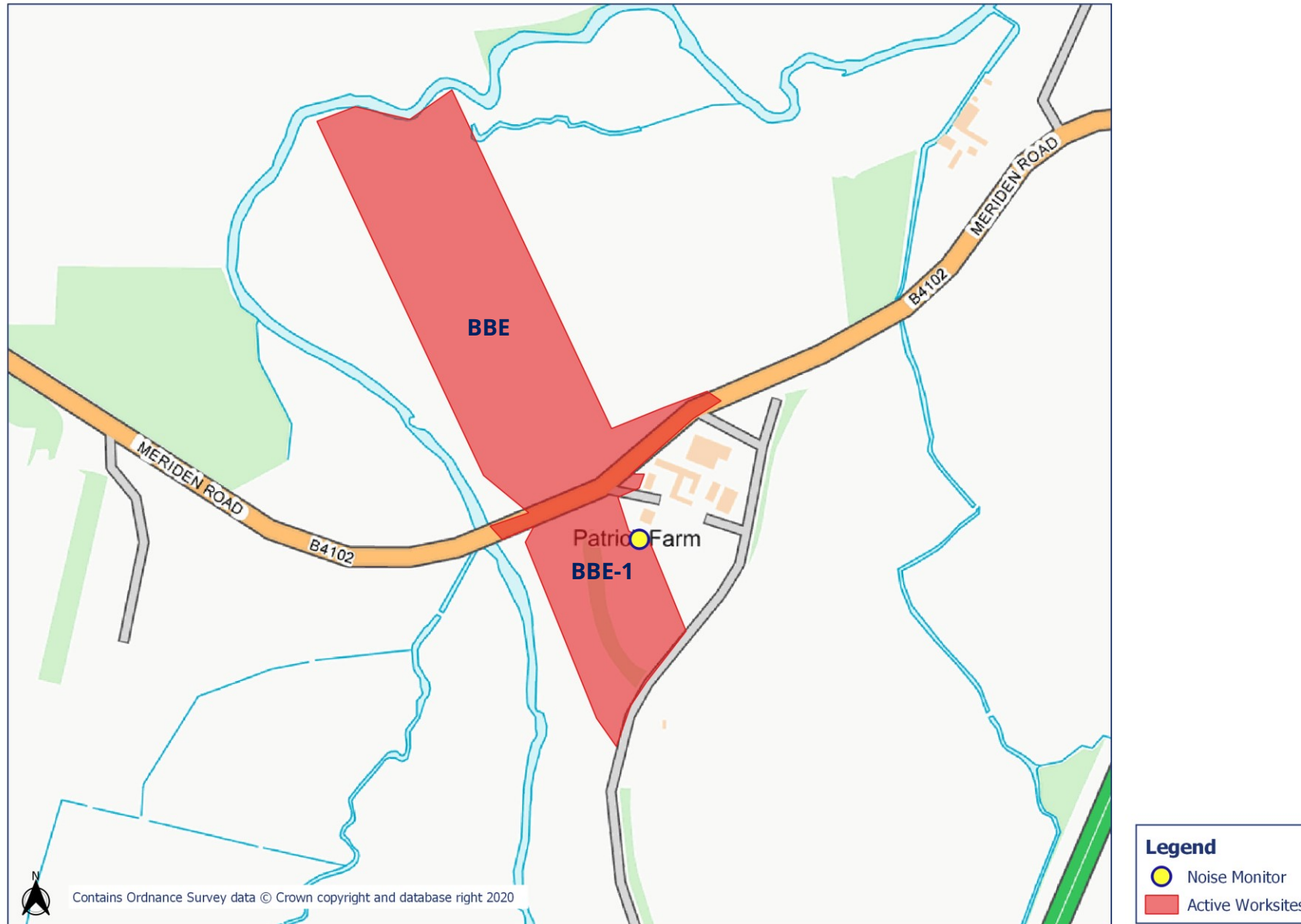
OFFICIAL

Noise and Vibration Monitoring Plan - 4



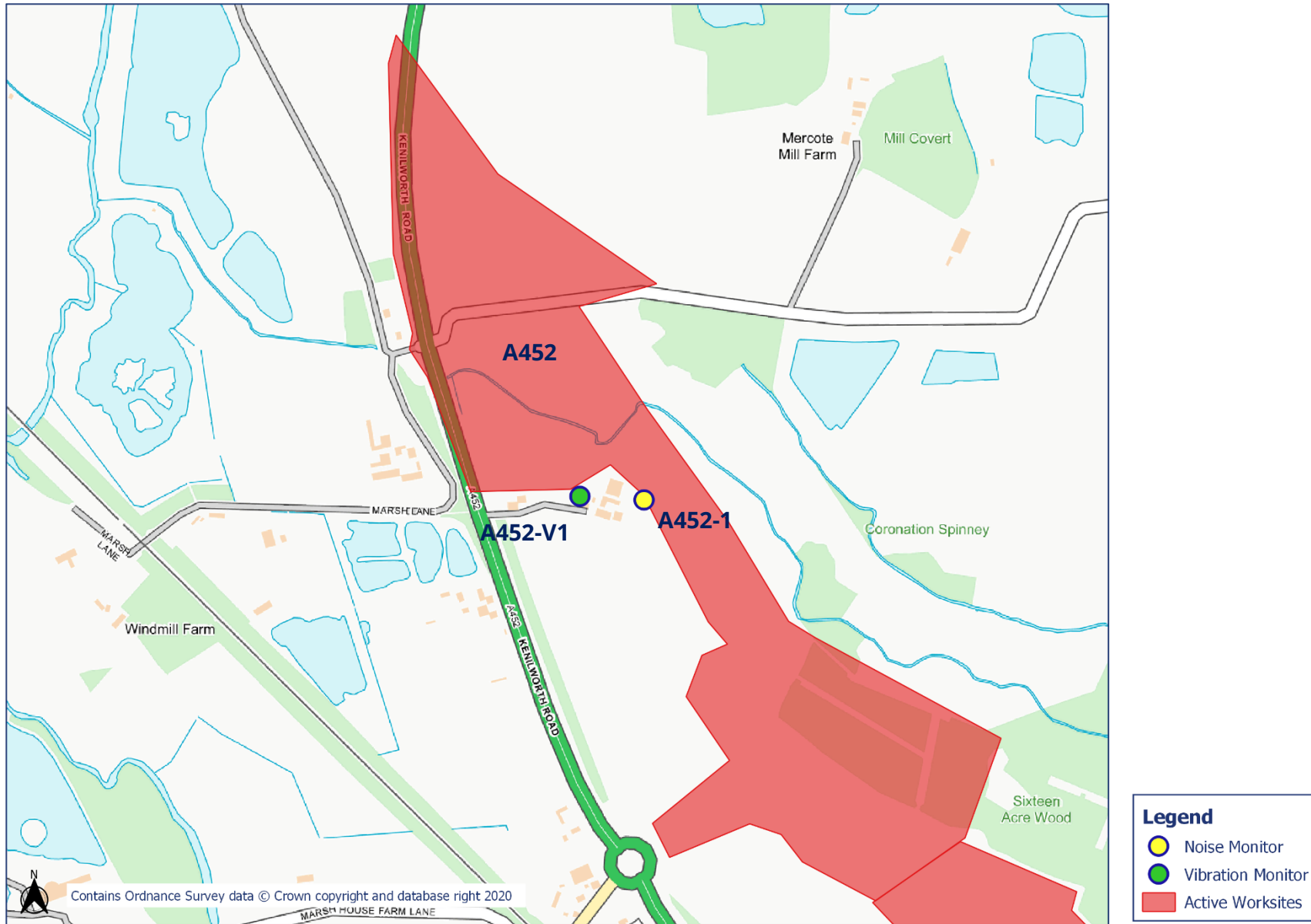
OFFICIAL

Noise and Vibration Monitoring Plan - 5



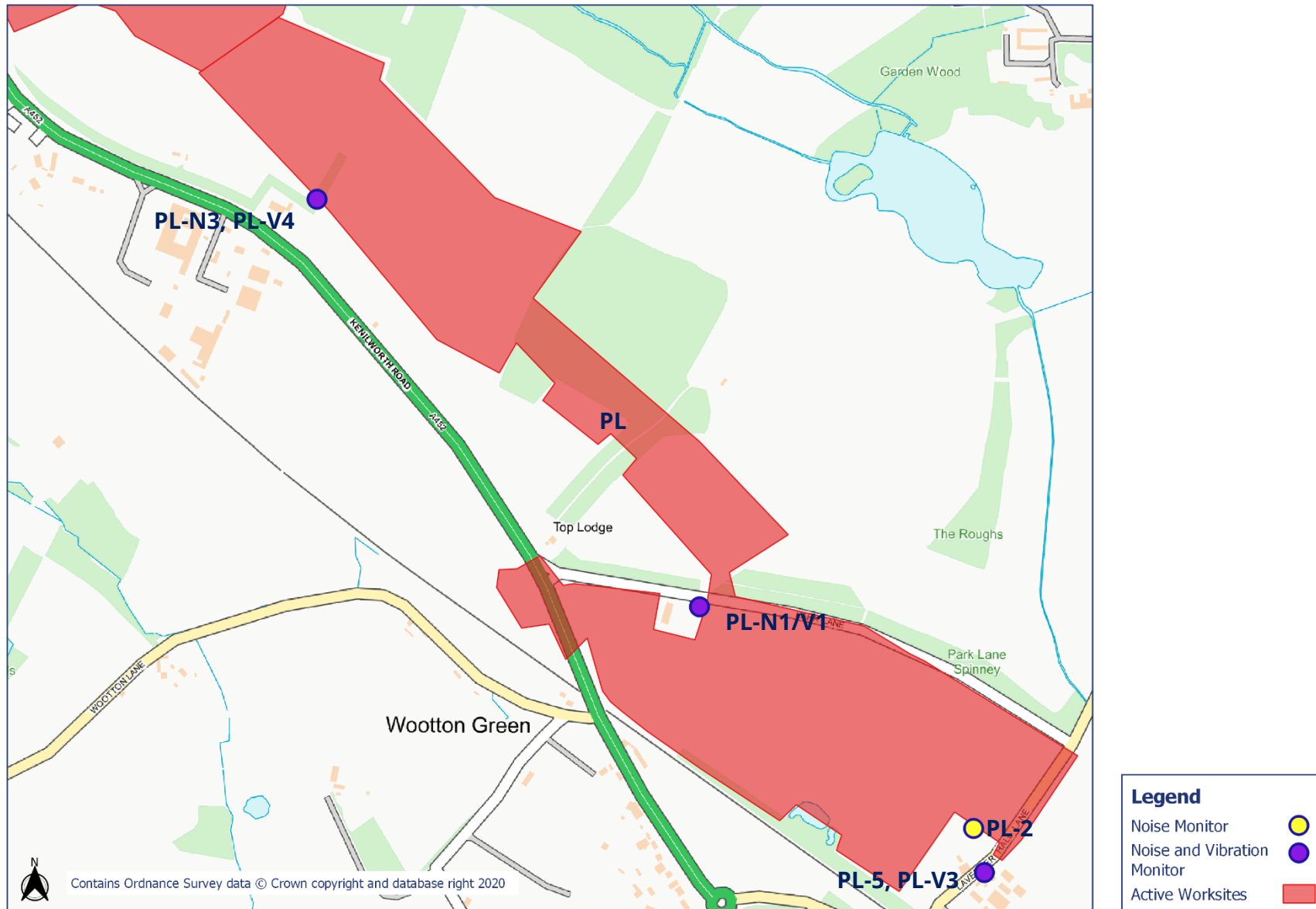
OFFICIAL

Noise and Vibration Monitoring Plan - 6



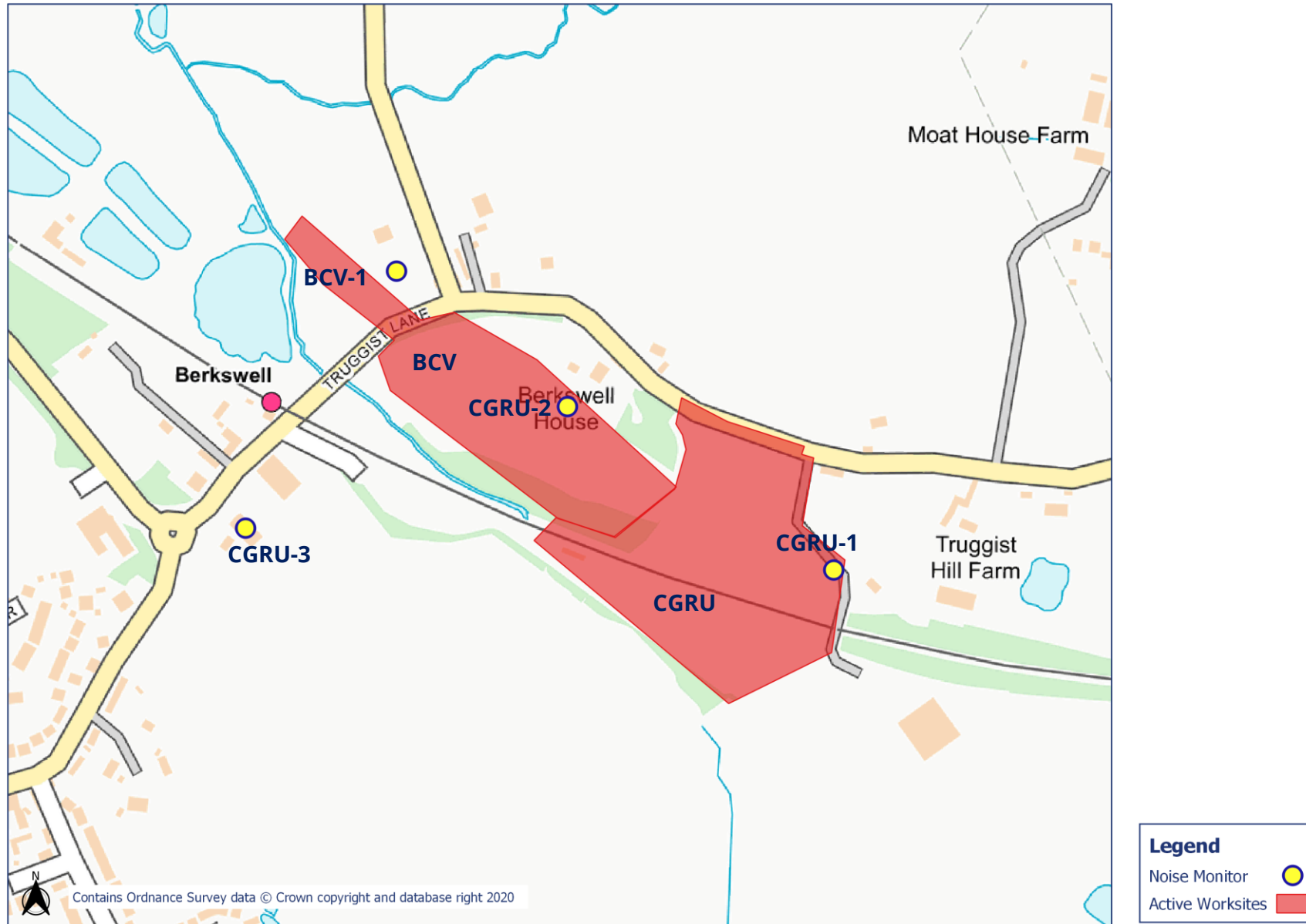
OFFICIAL

Noise and Vibration Monitoring Plan - 7



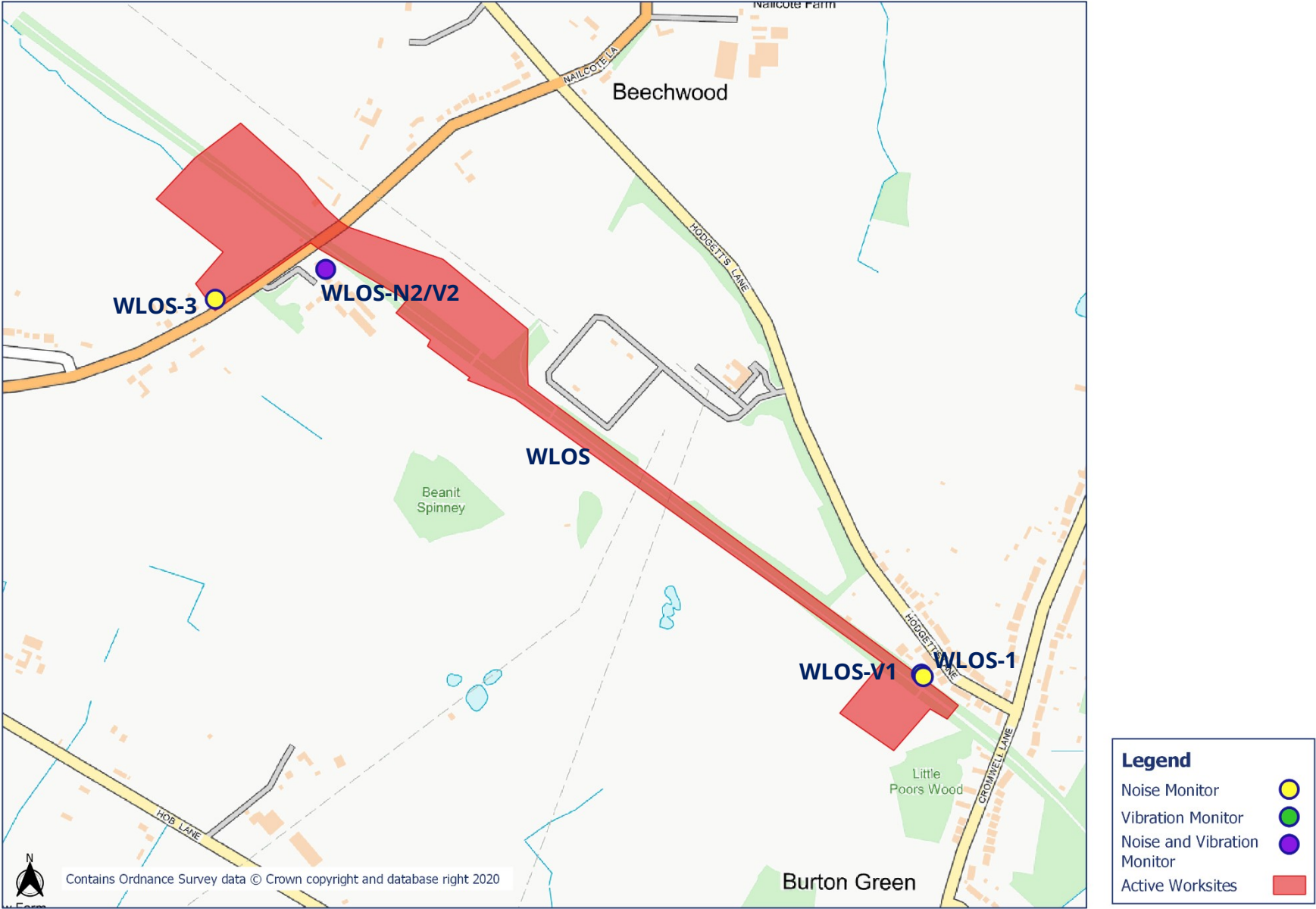
OFFICIAL

Noise and Vibration Monitoring Plan - 8



OFFICIAL

Noise and Vibration Monitoring Plan - 9



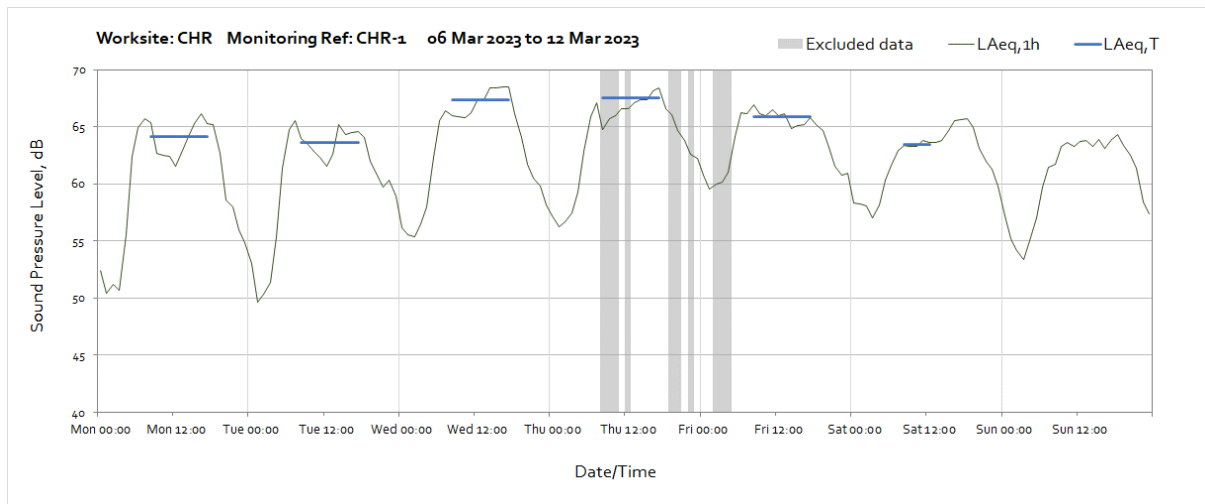
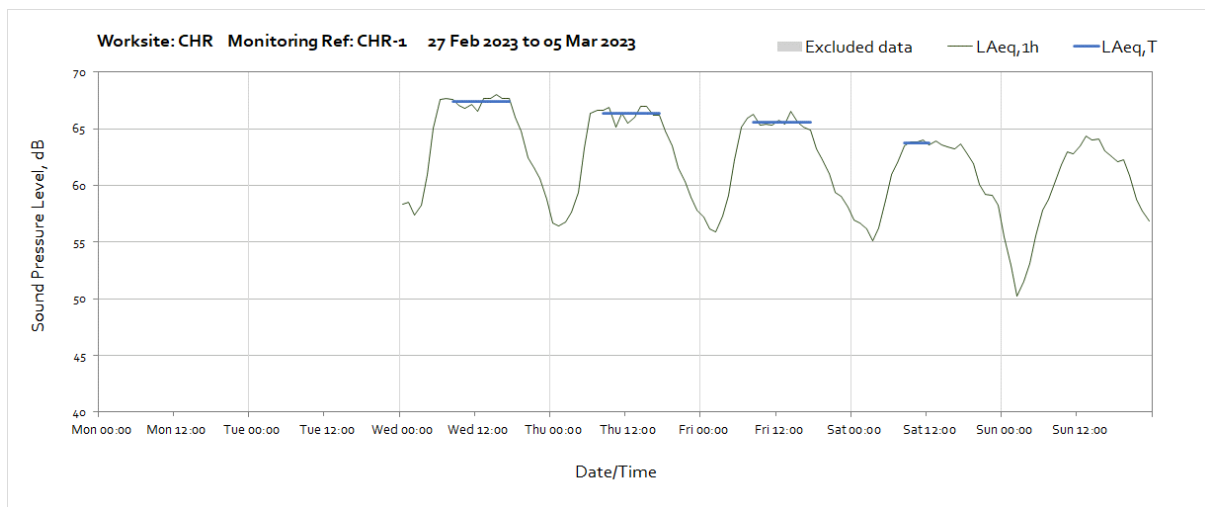
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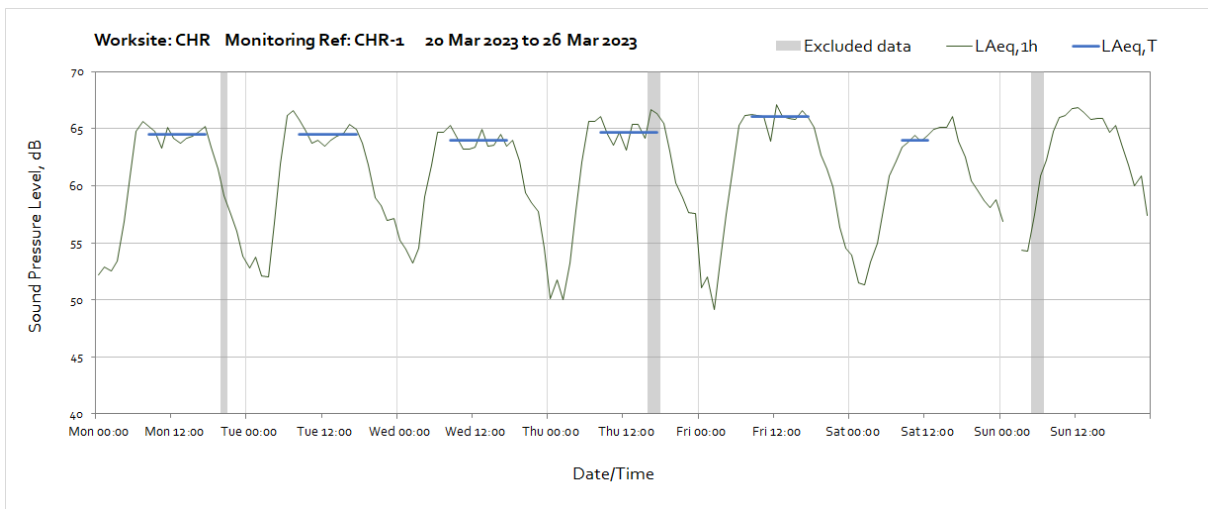
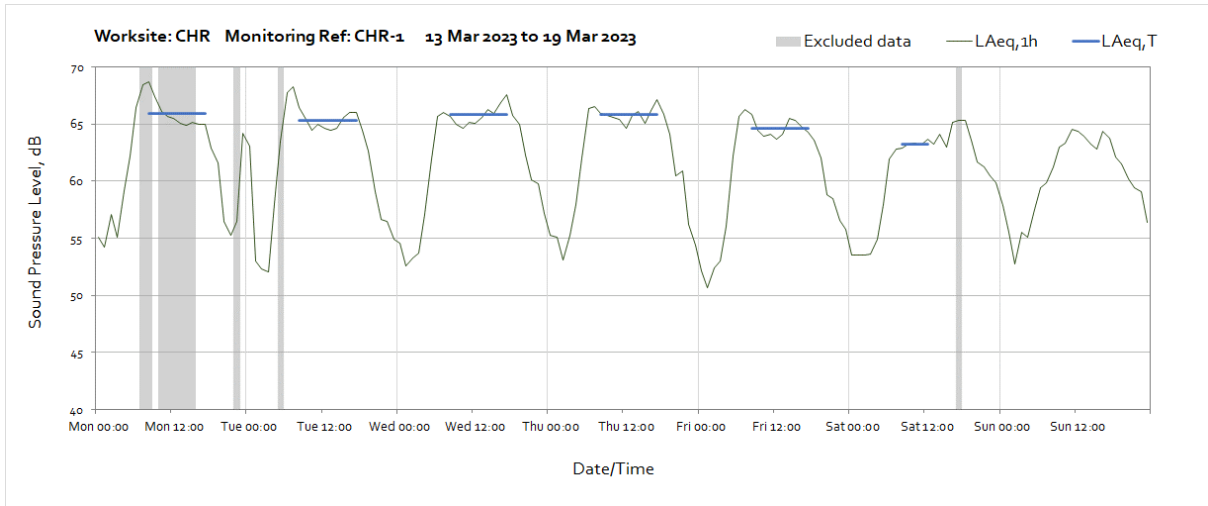
Appendix C Data

Noise

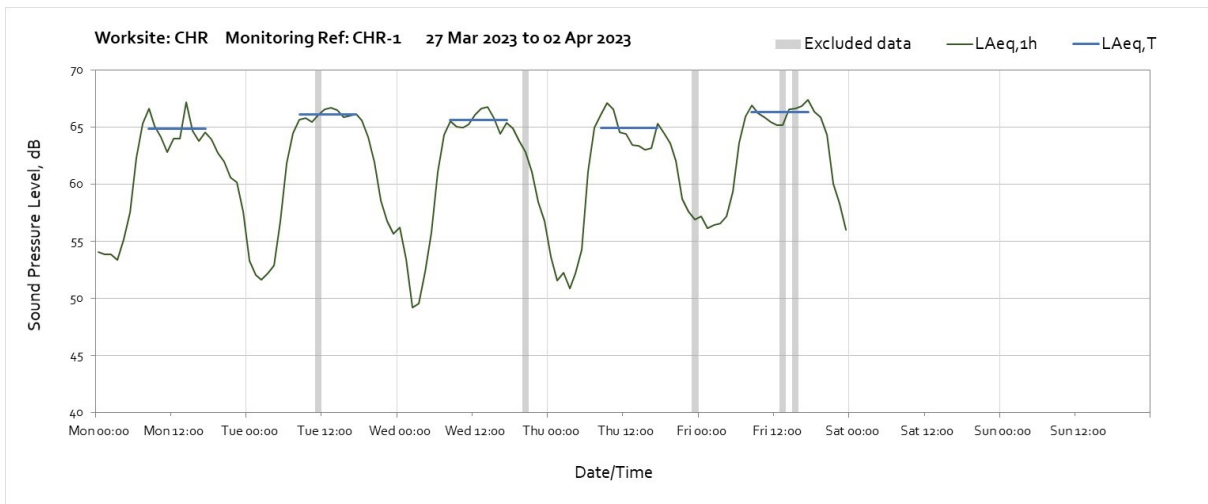
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

Worksite: CHR - Monitoring Ref: CHR-1

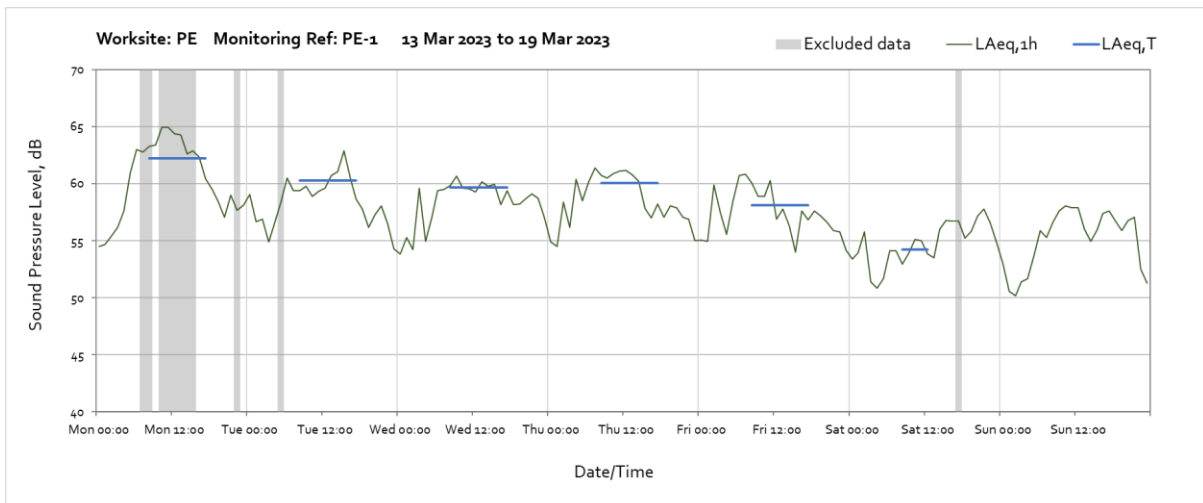
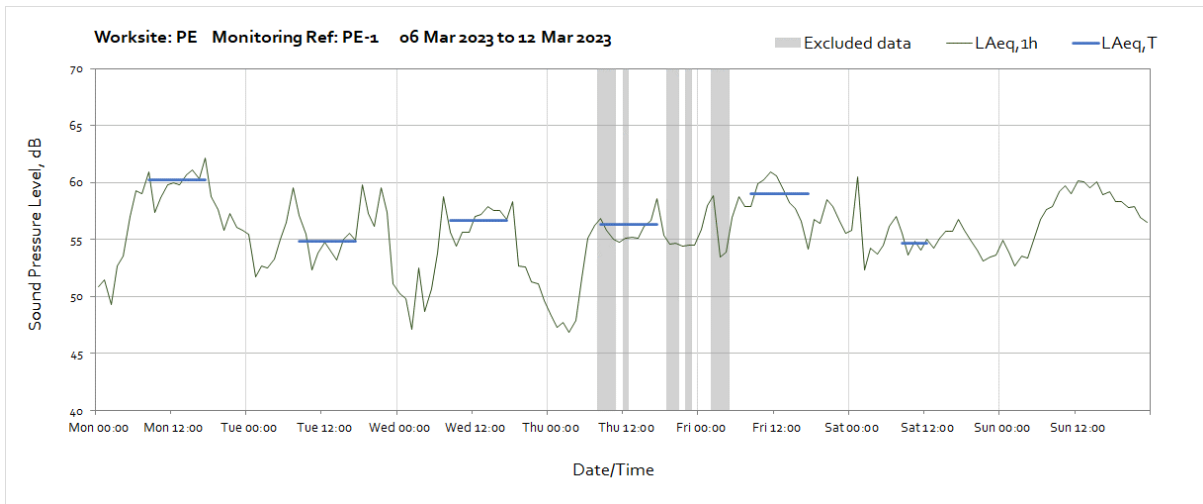
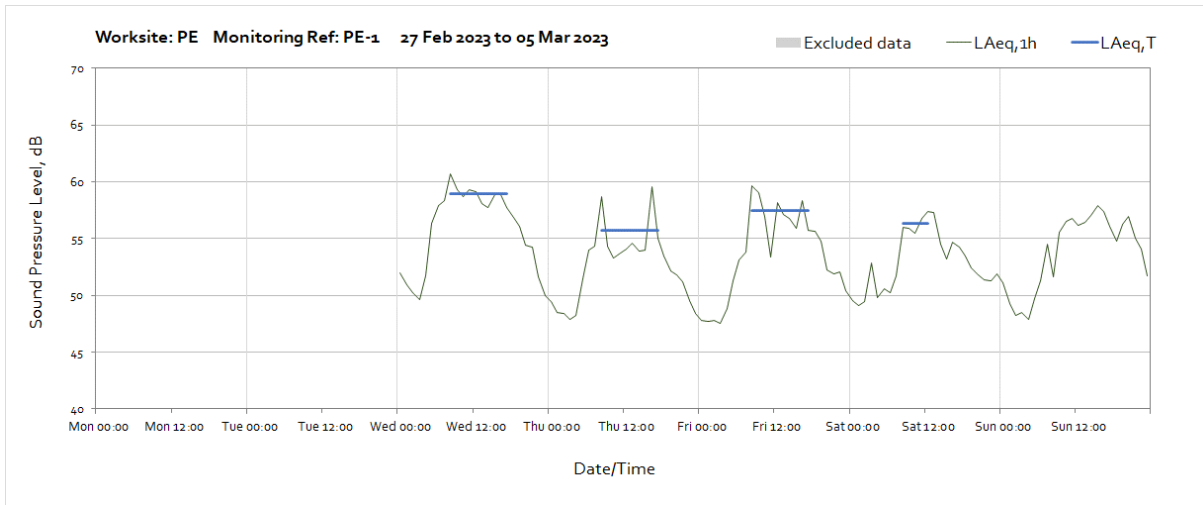




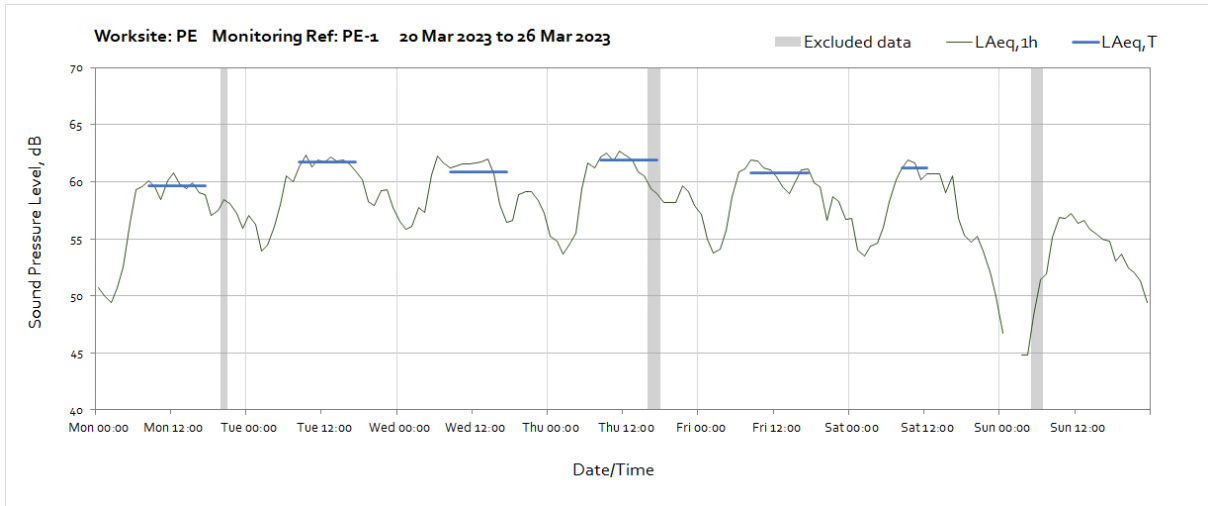
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.



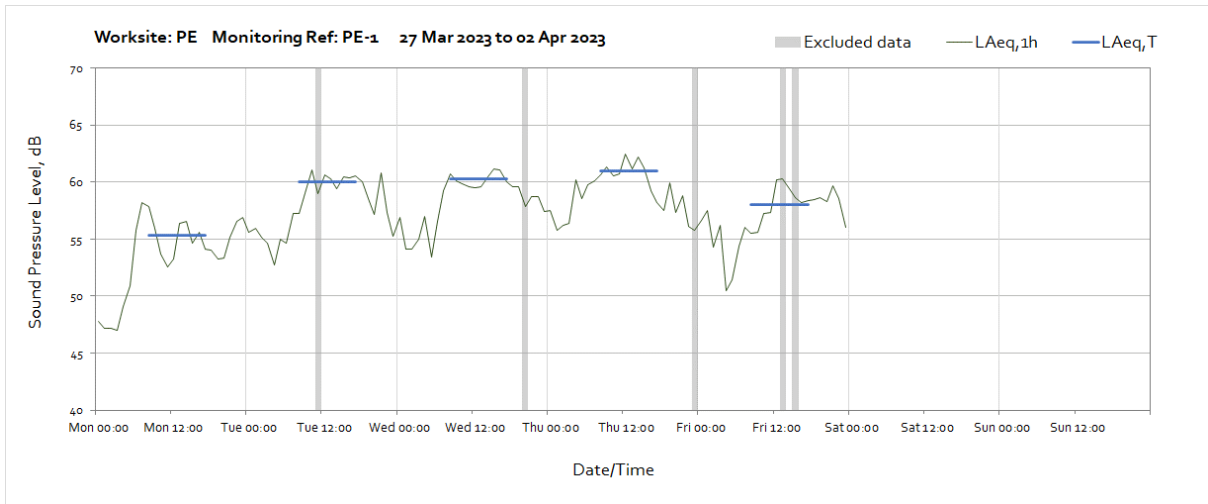
Worksite: PE - Monitoring Ref: PE-1



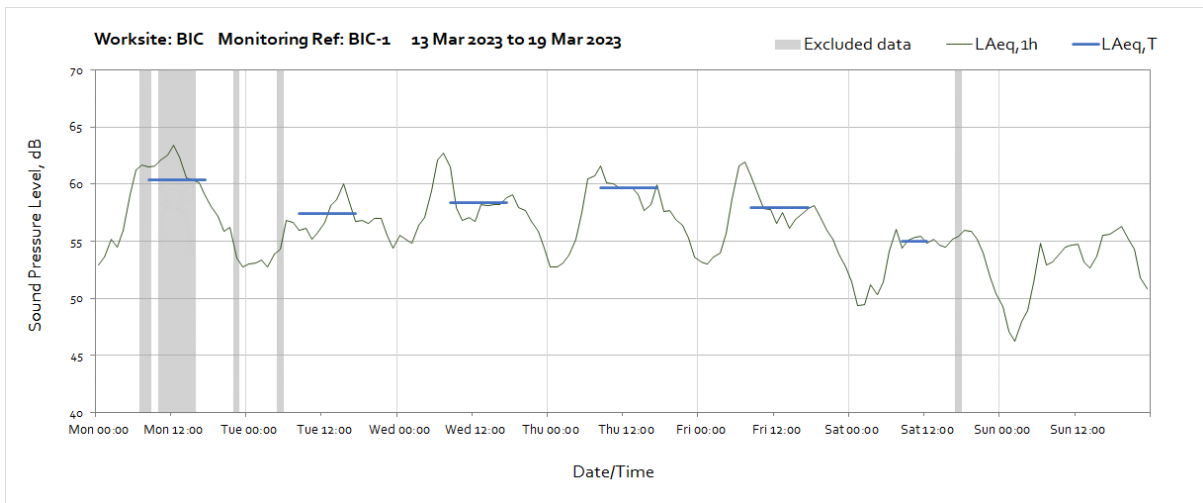
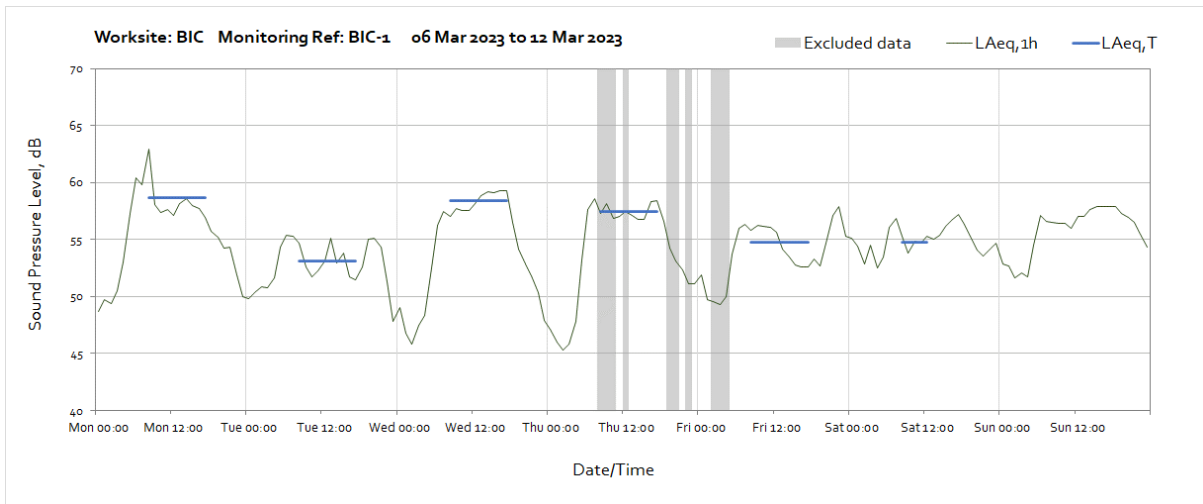
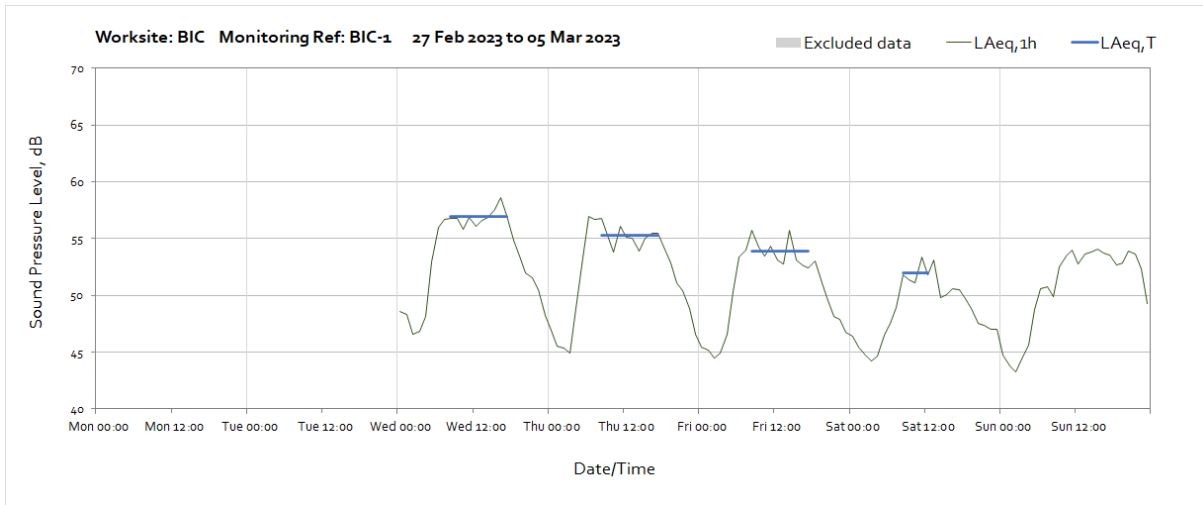
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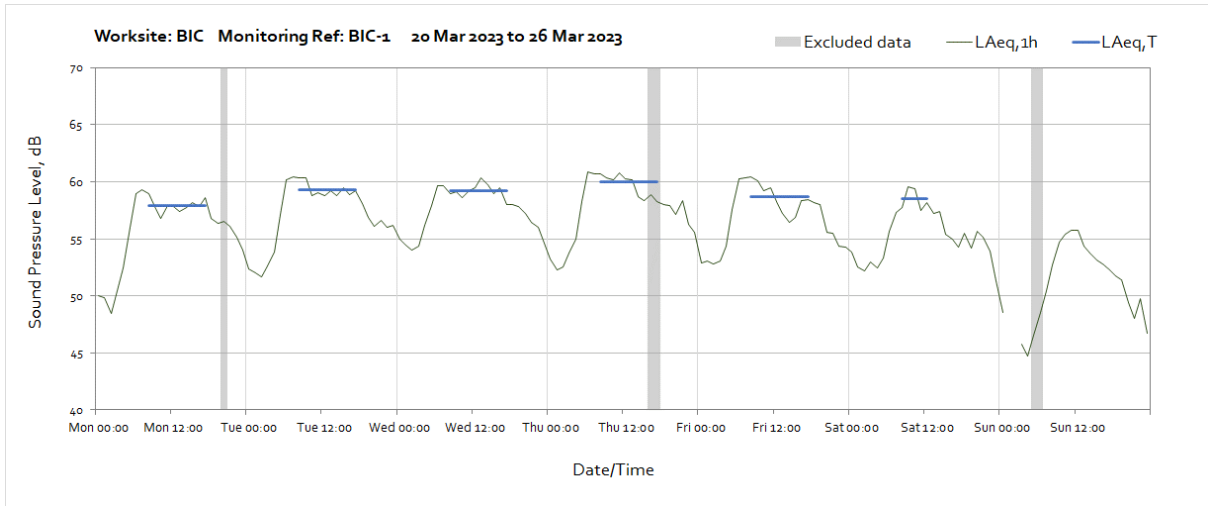
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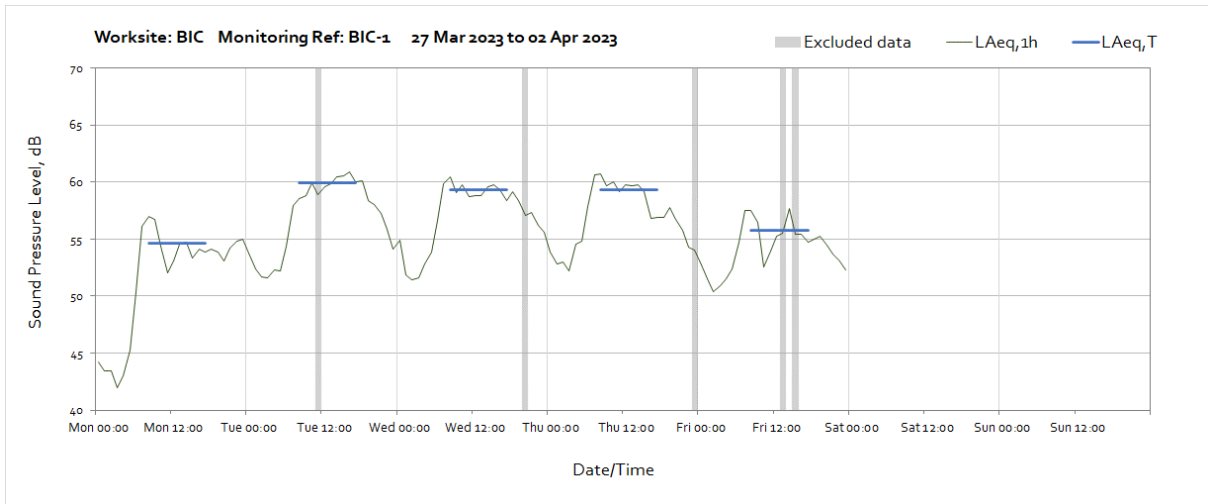
Worksite: BIC - Monitoring Ref: BIC-1



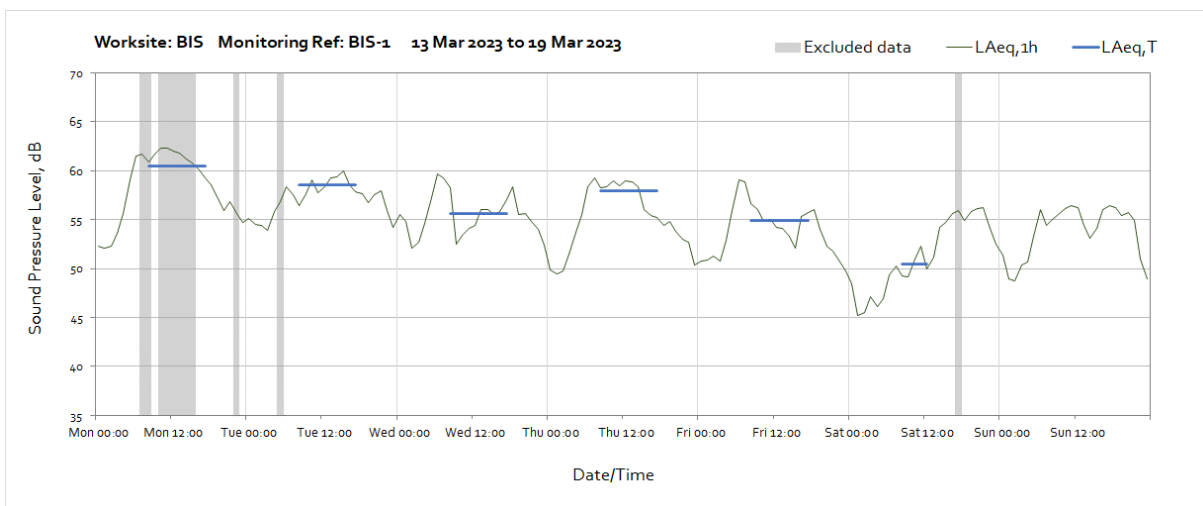
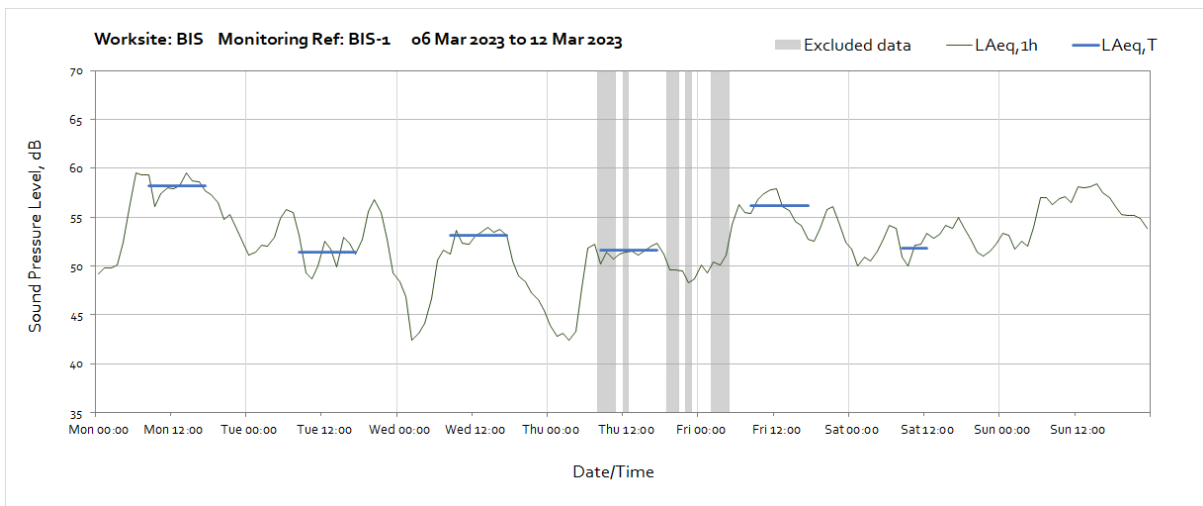
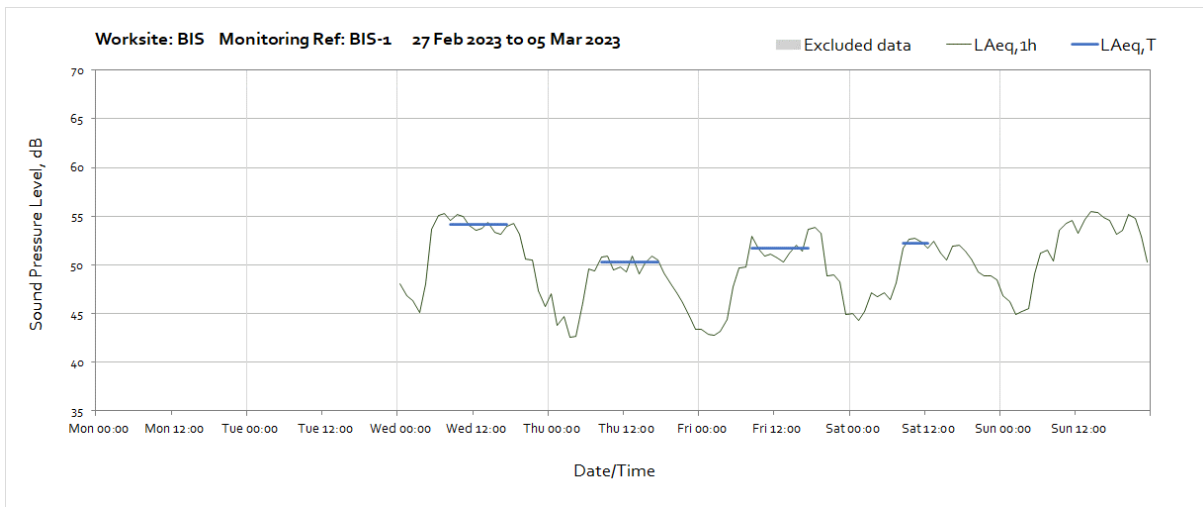
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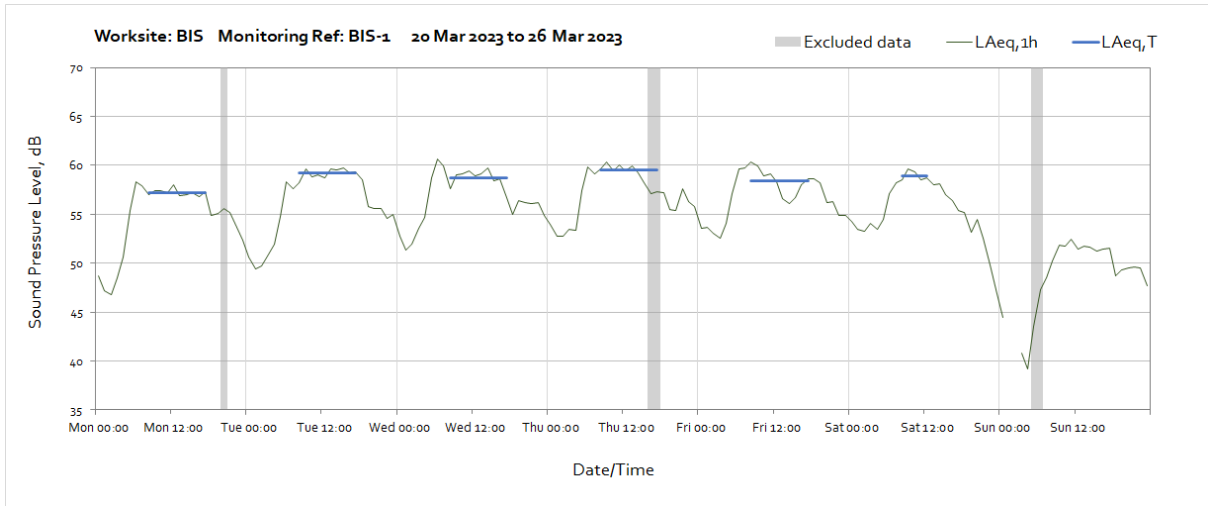
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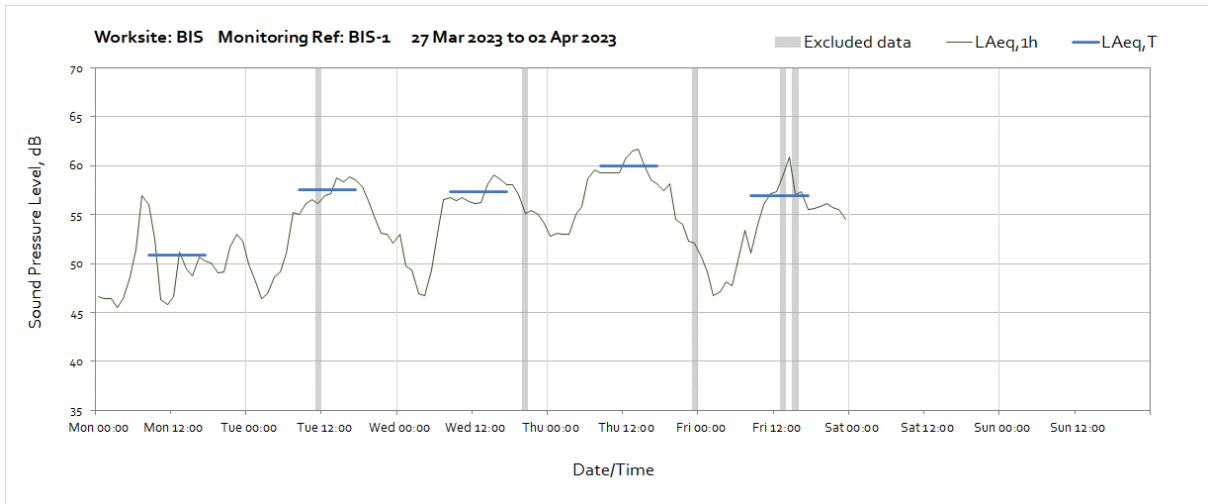
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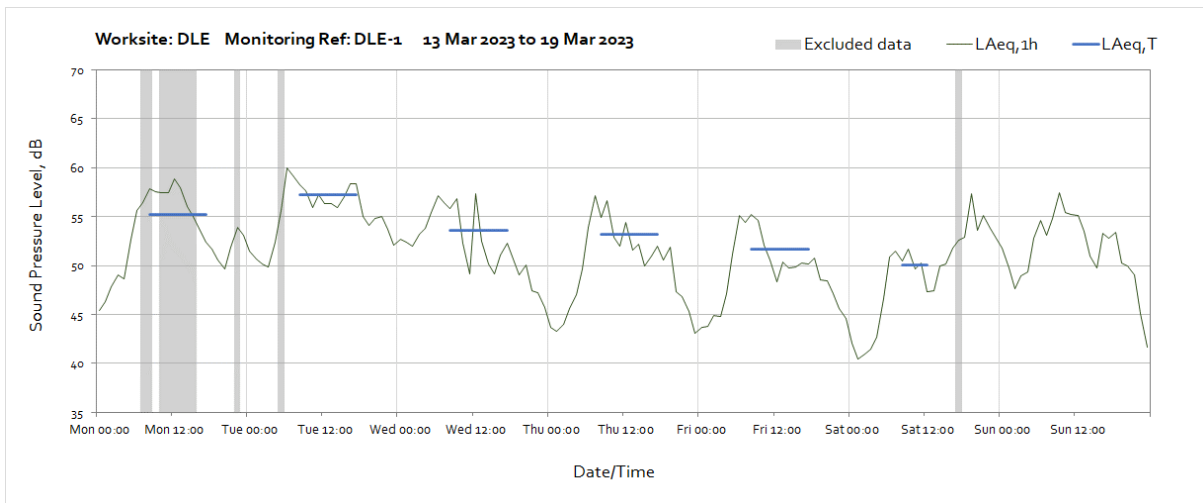
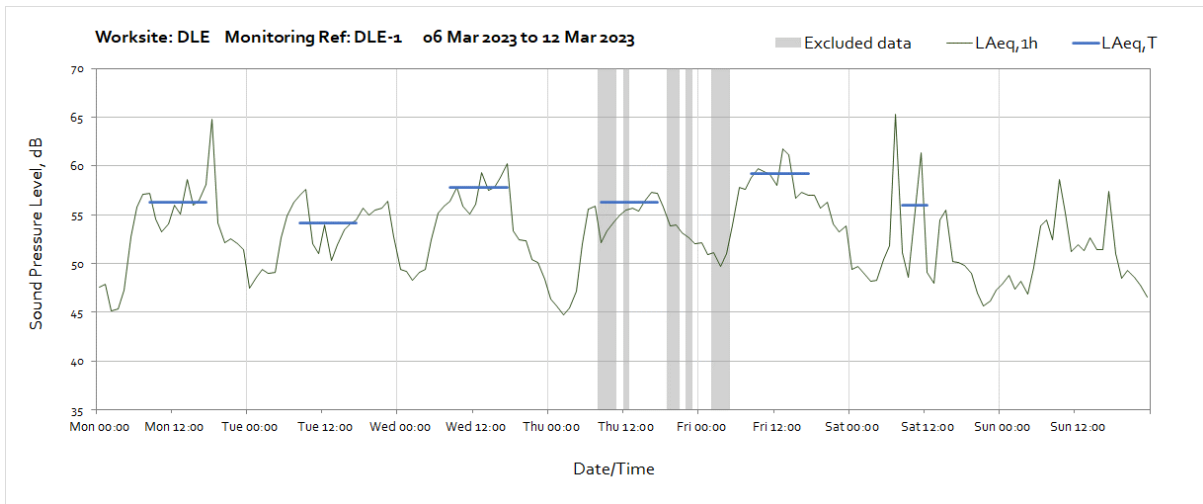
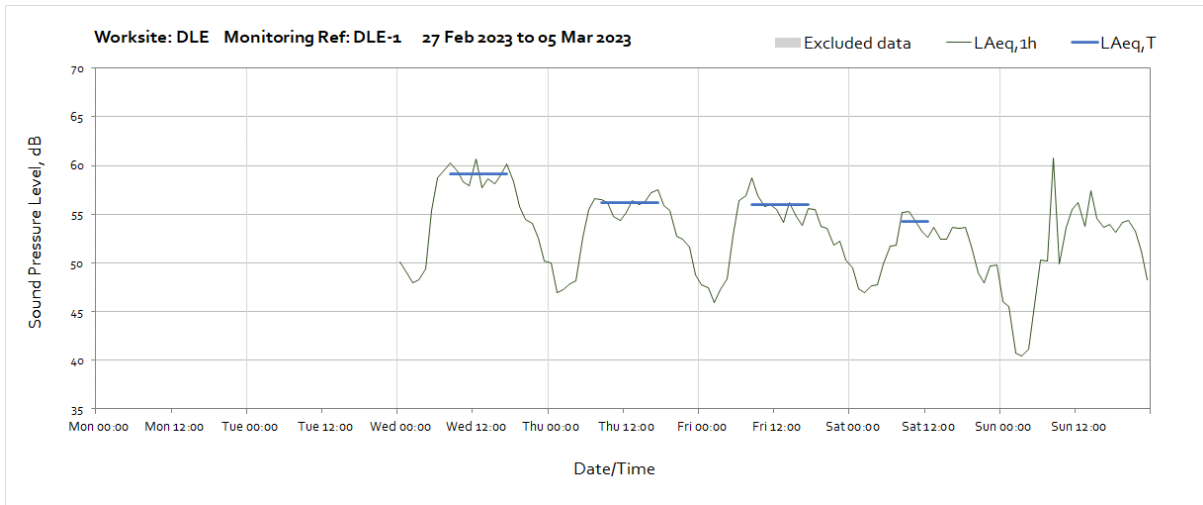
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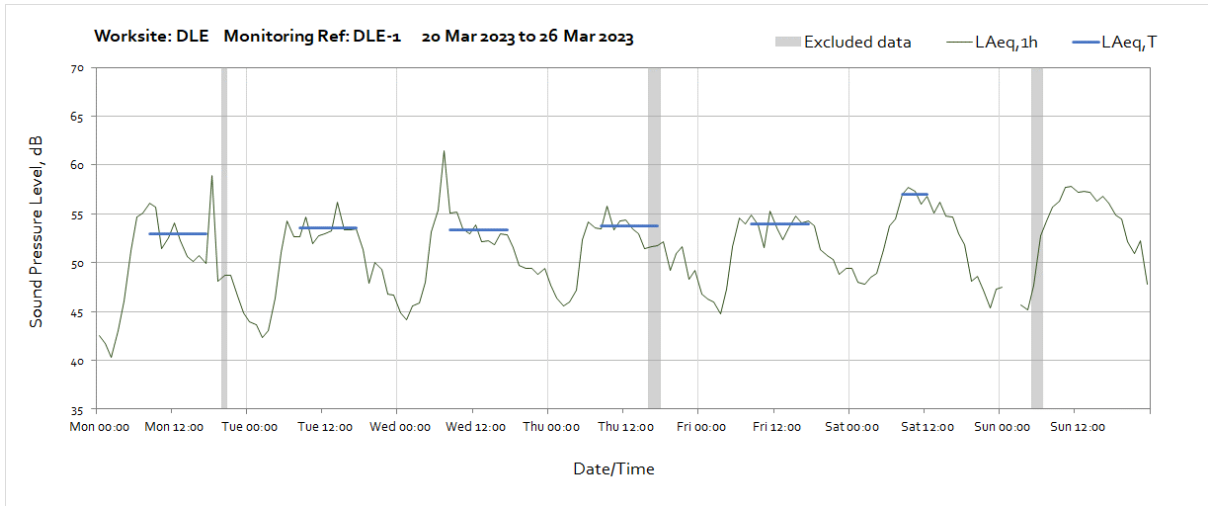
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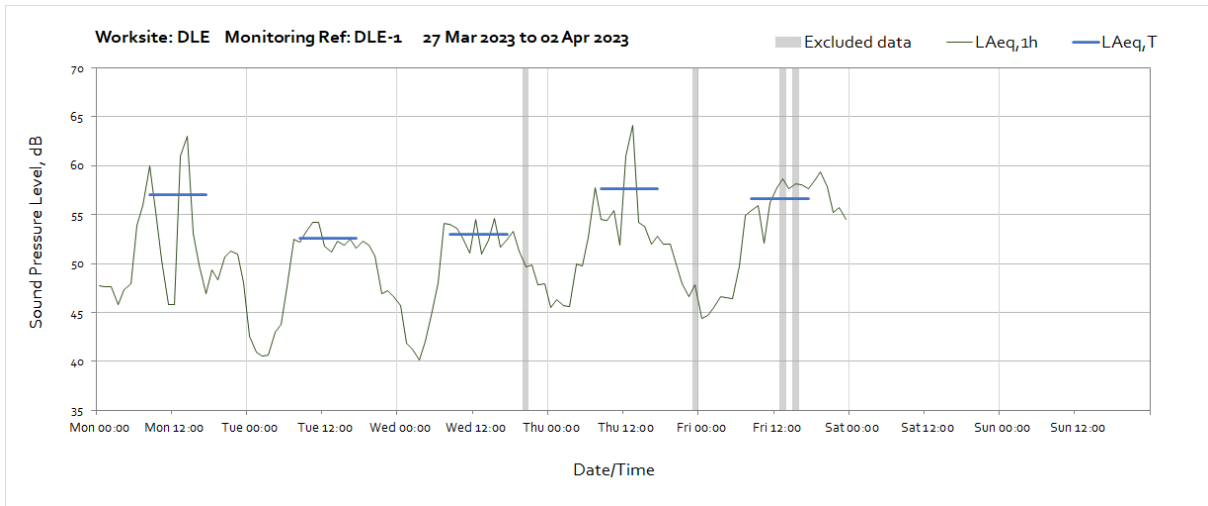
Worksite: DLE - Monitoring Ref: DLE-1



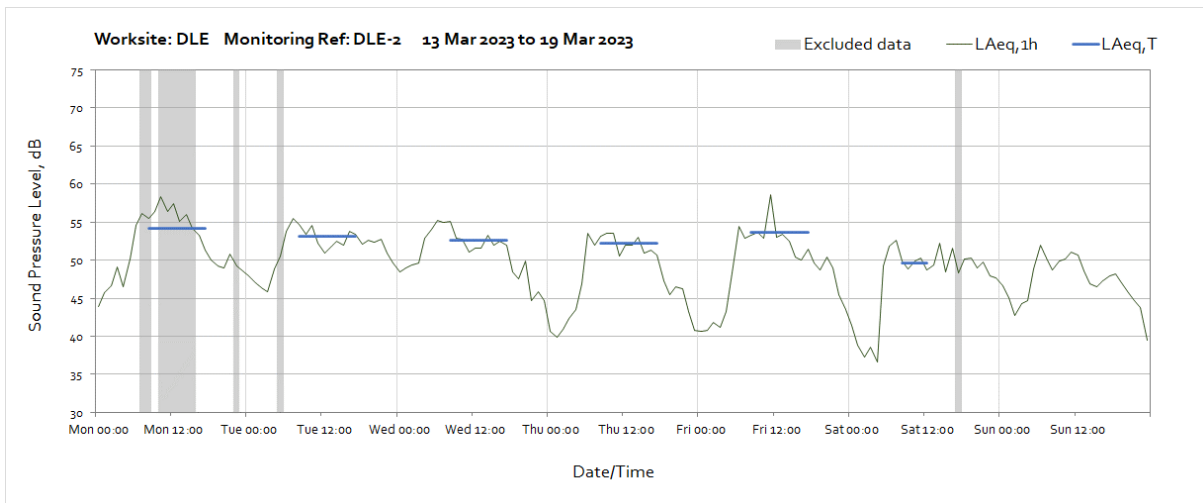
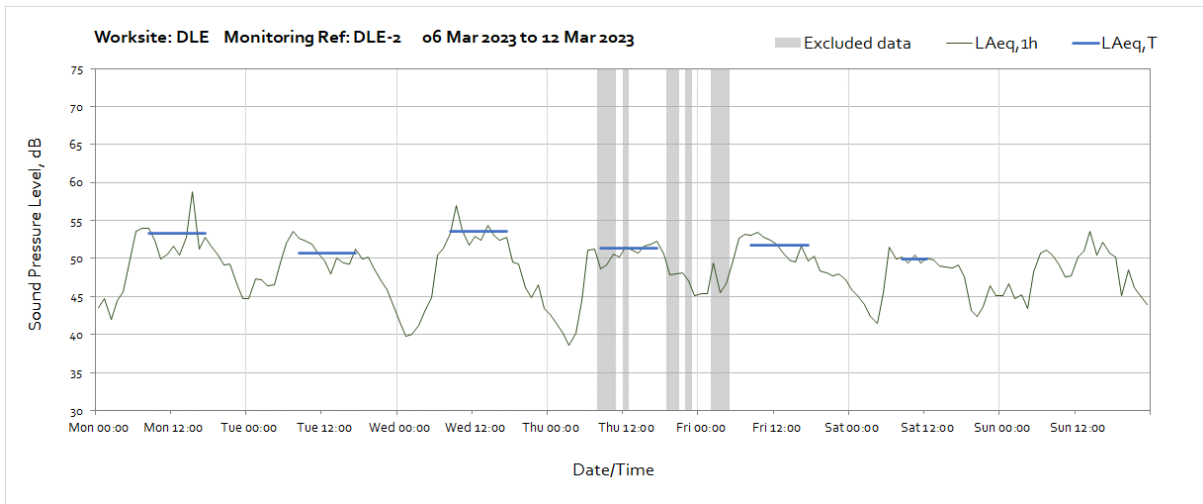
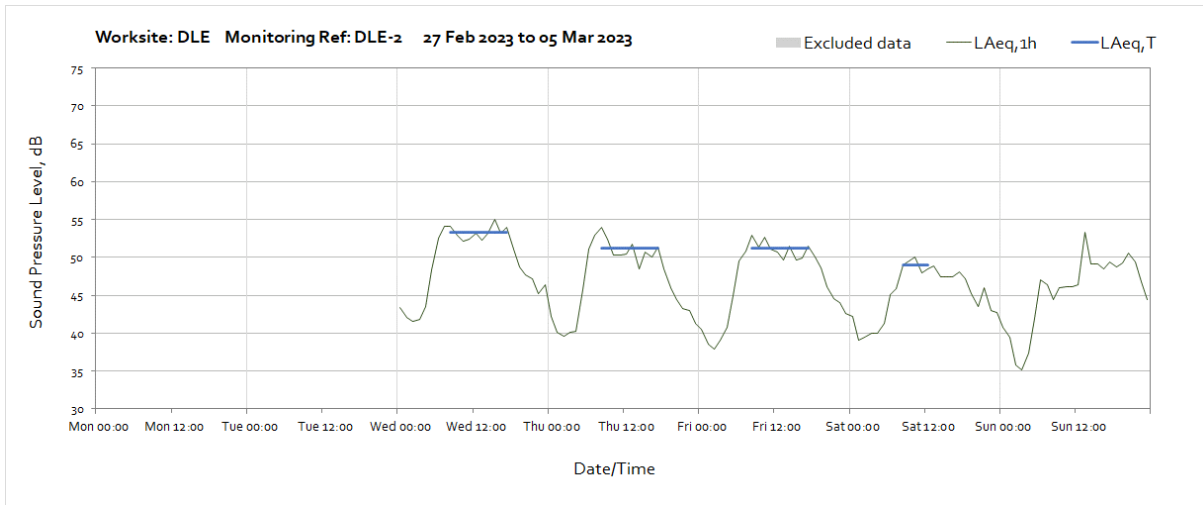
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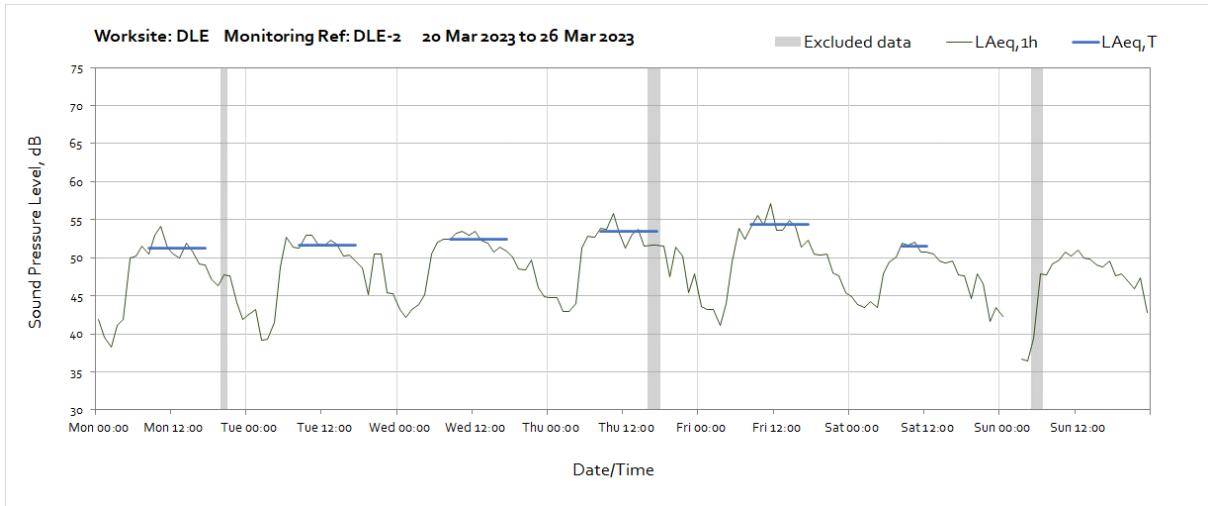
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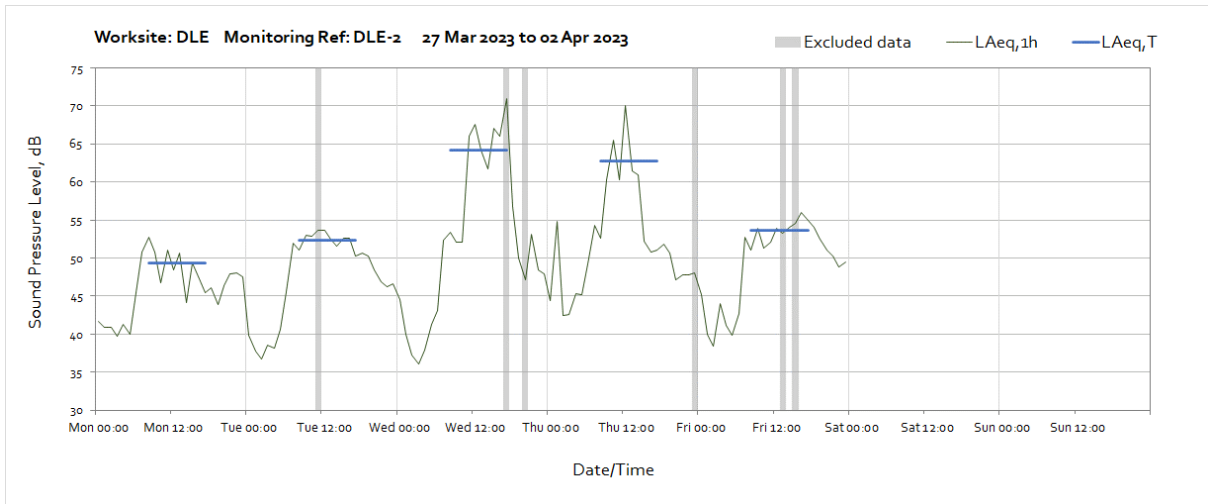
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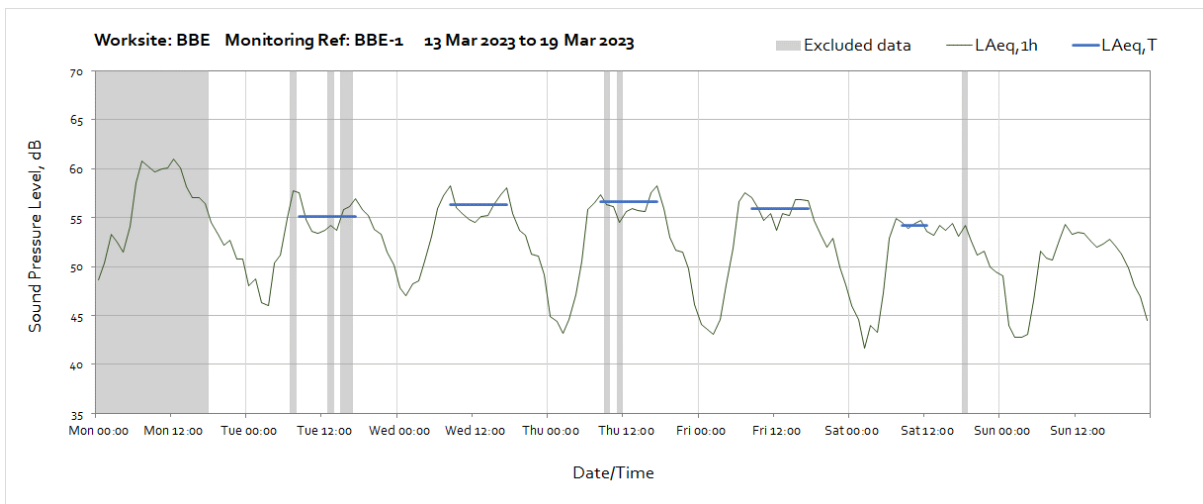
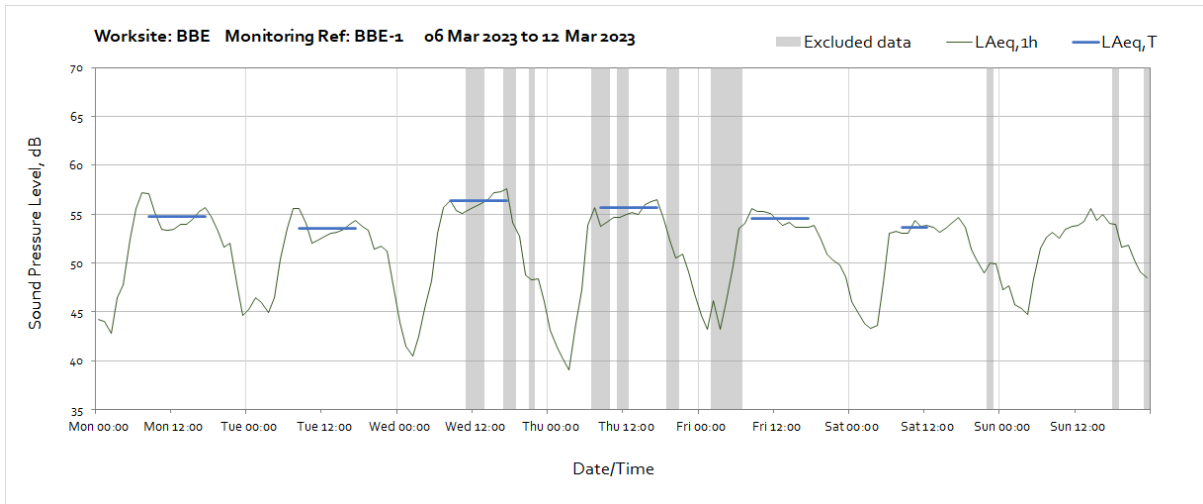
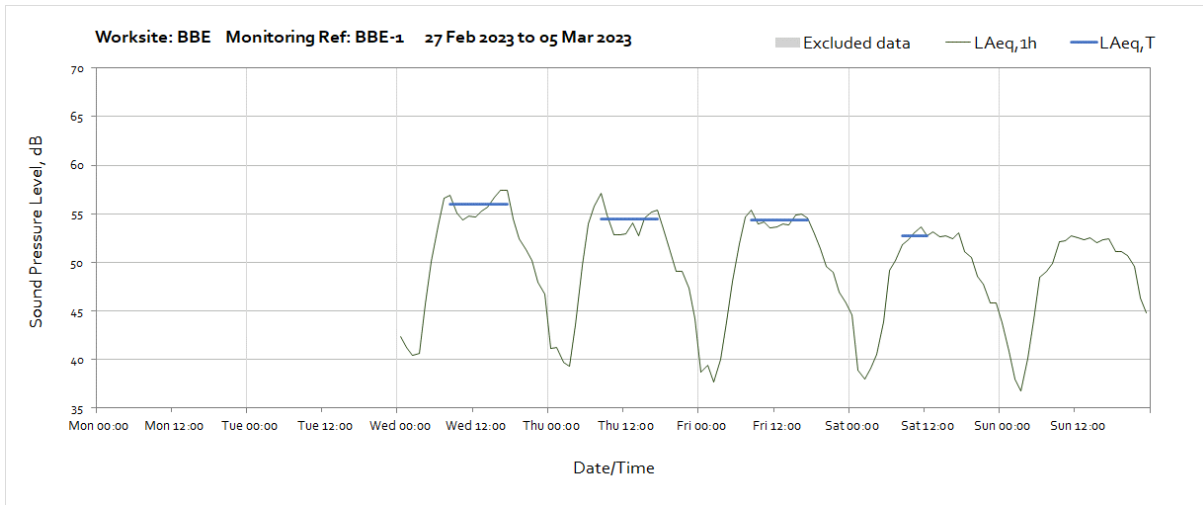
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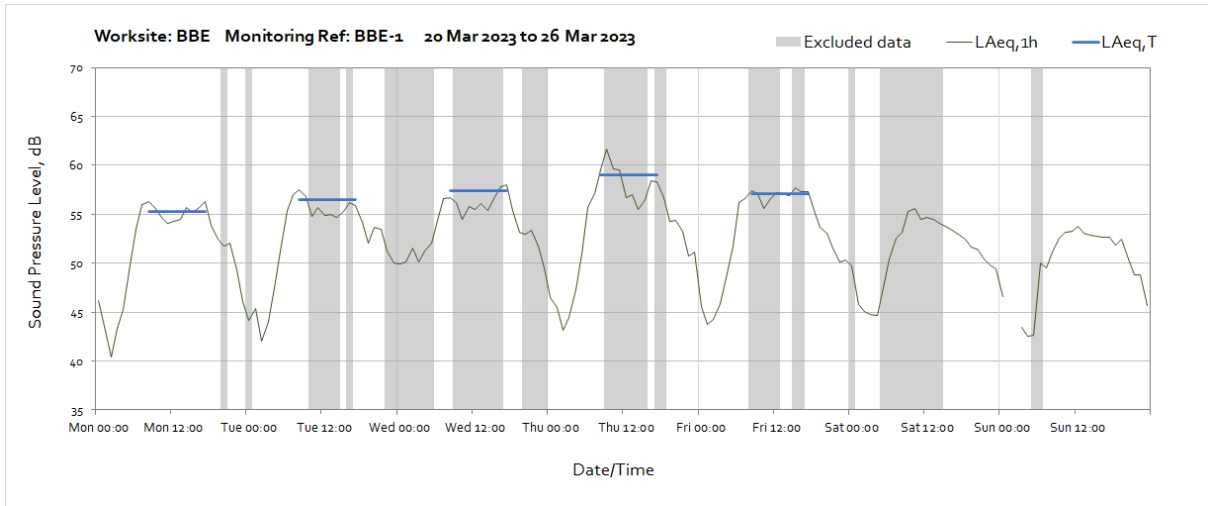


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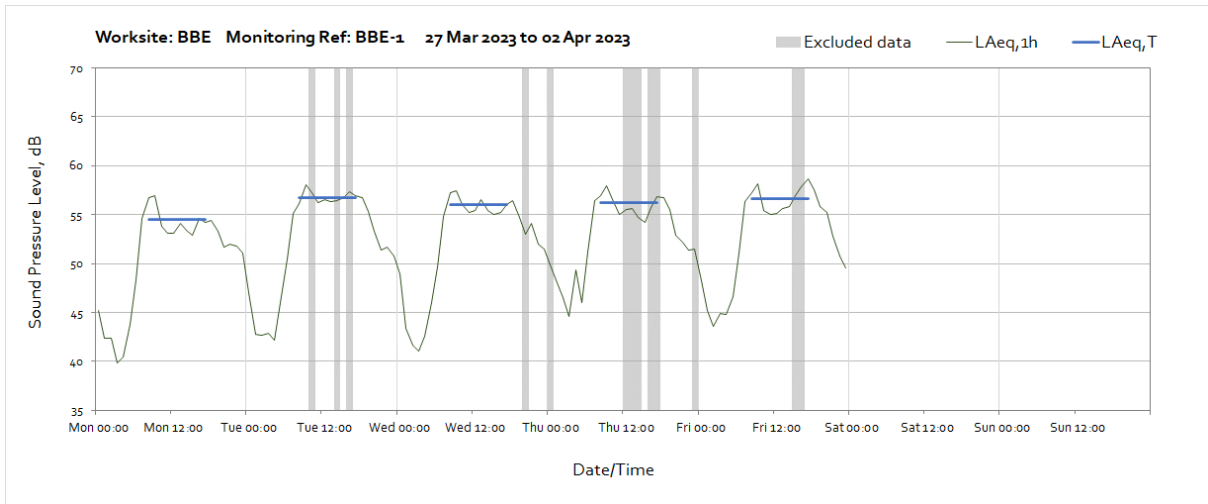


Worksite: BBE – Monitoring Ref: BBE-1

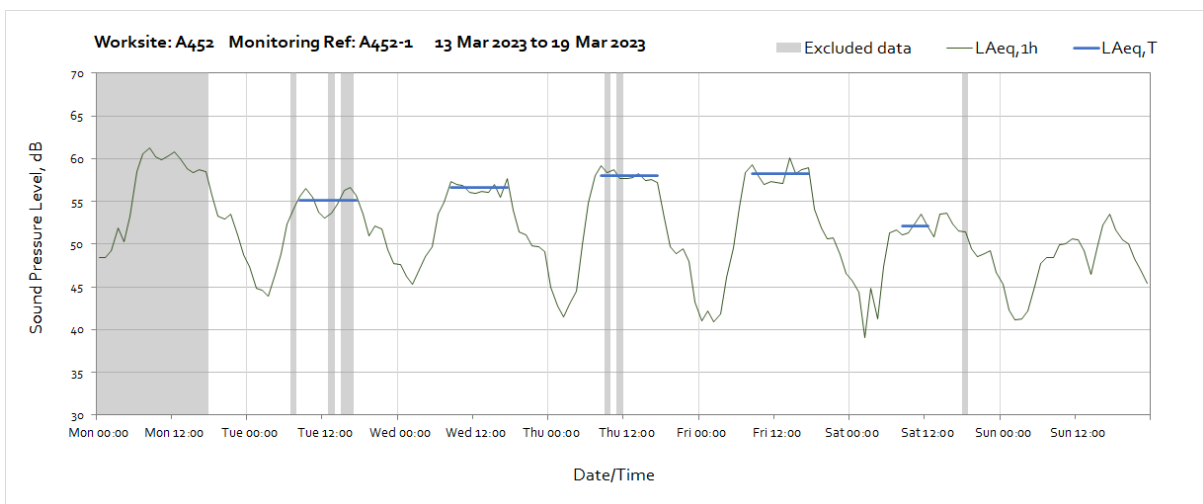
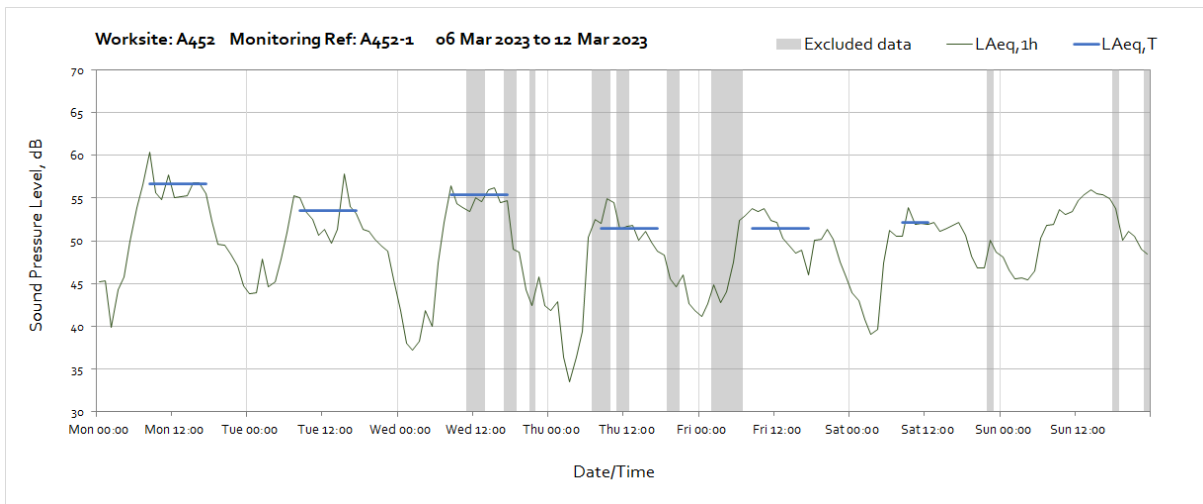
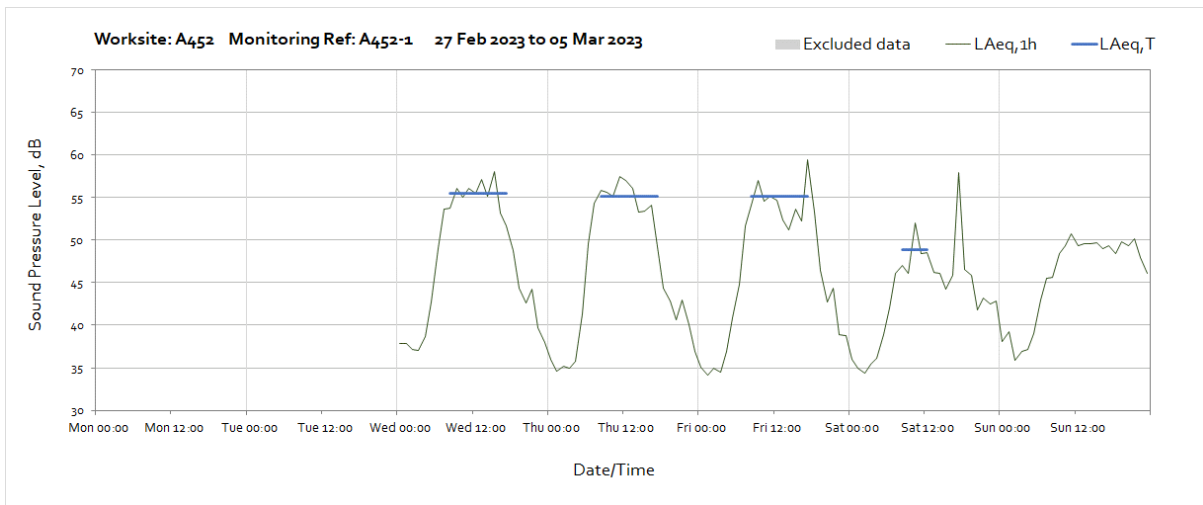




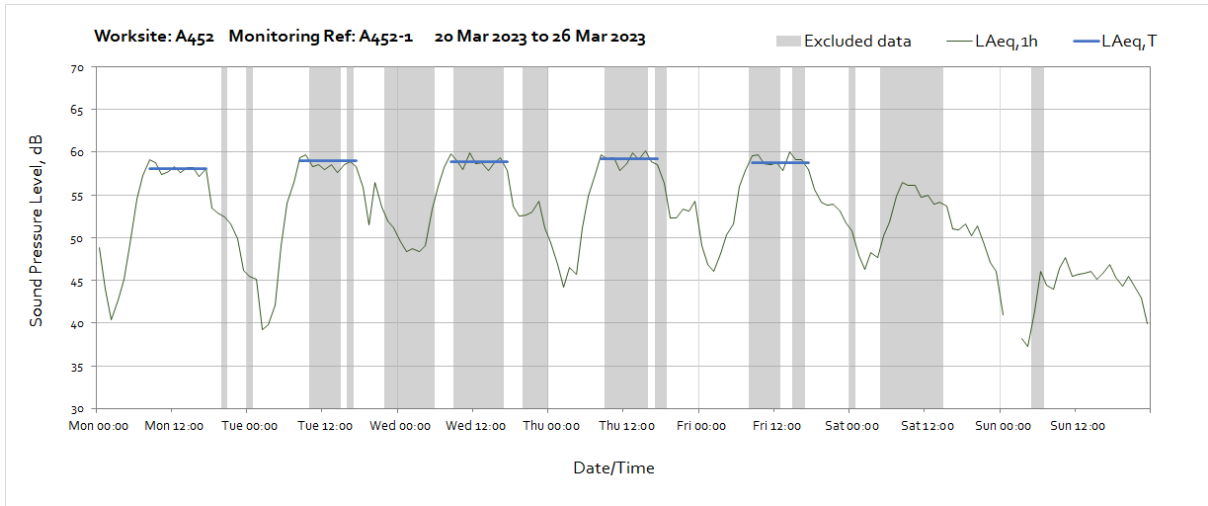
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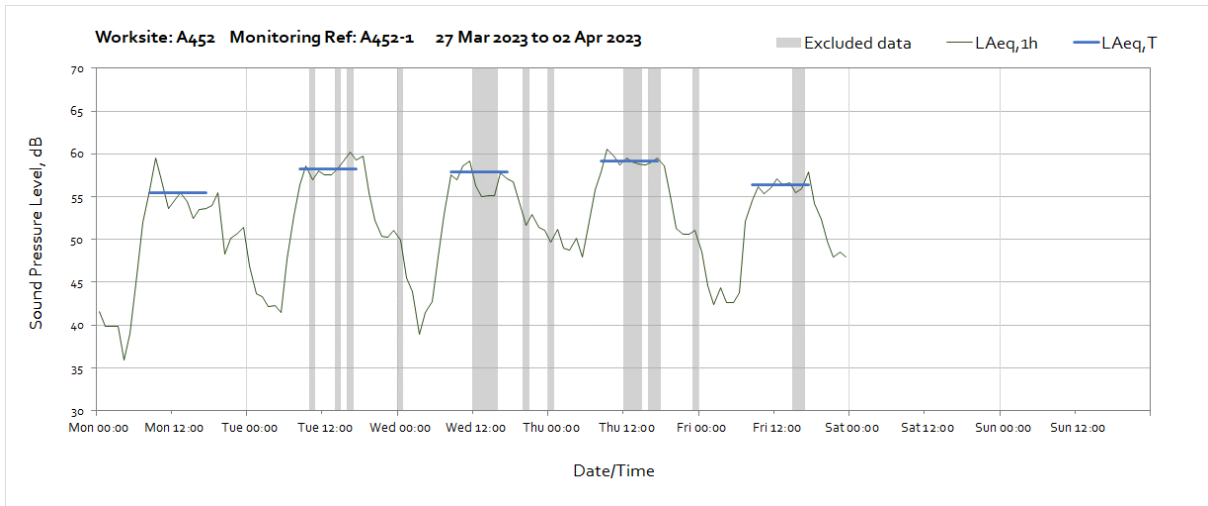
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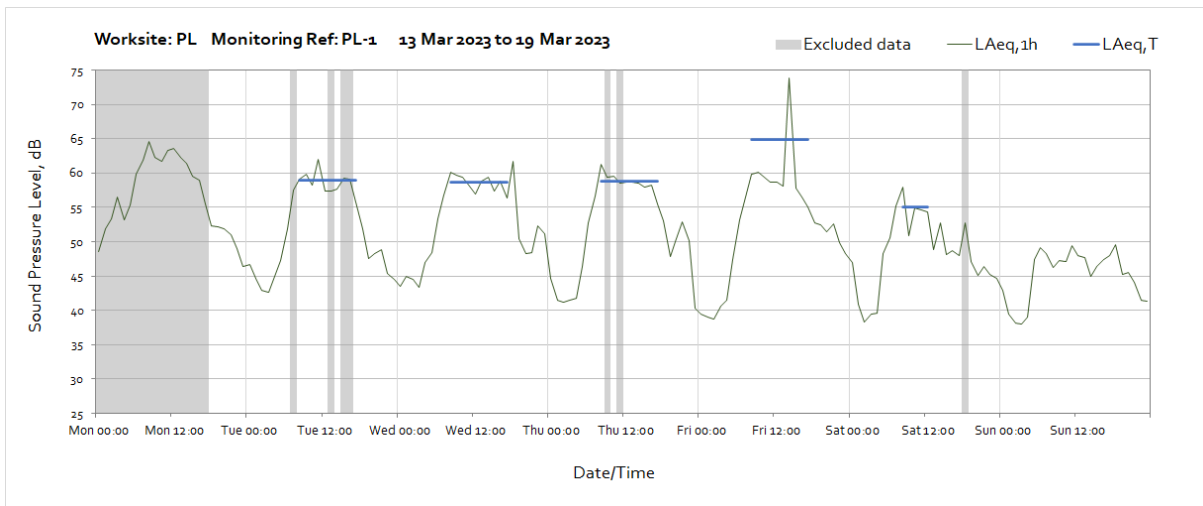
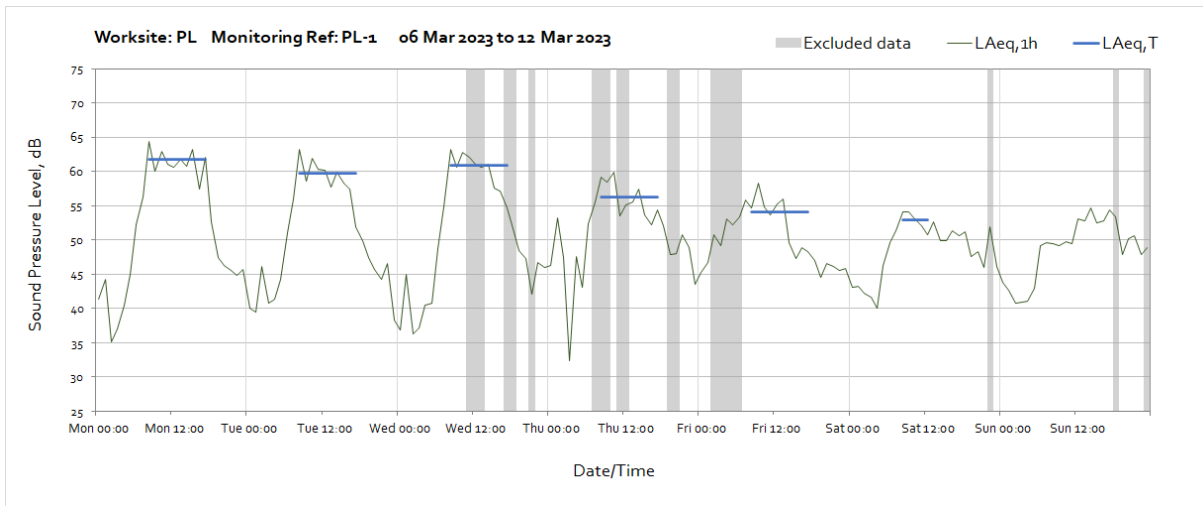
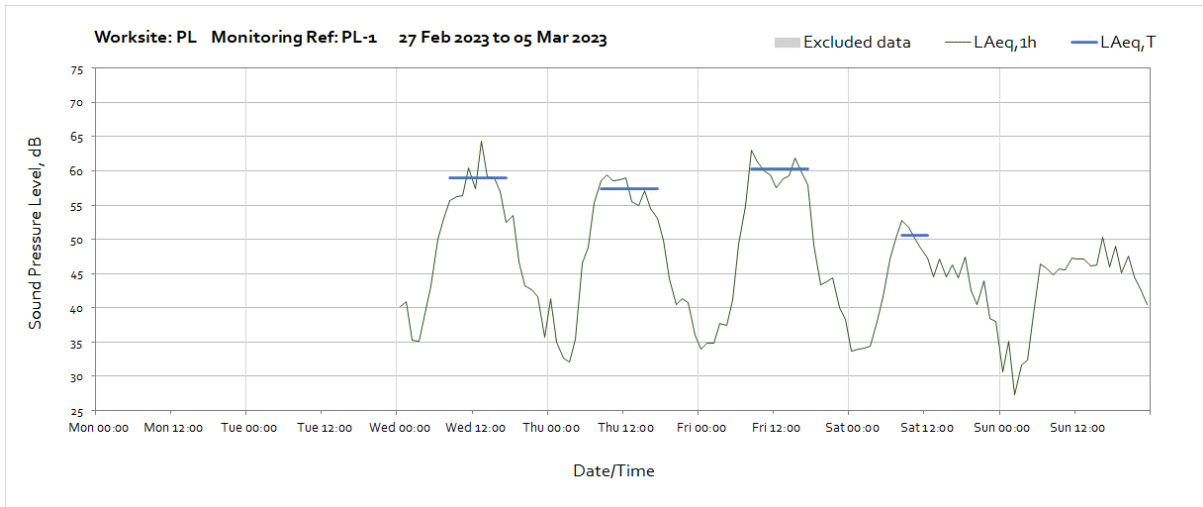
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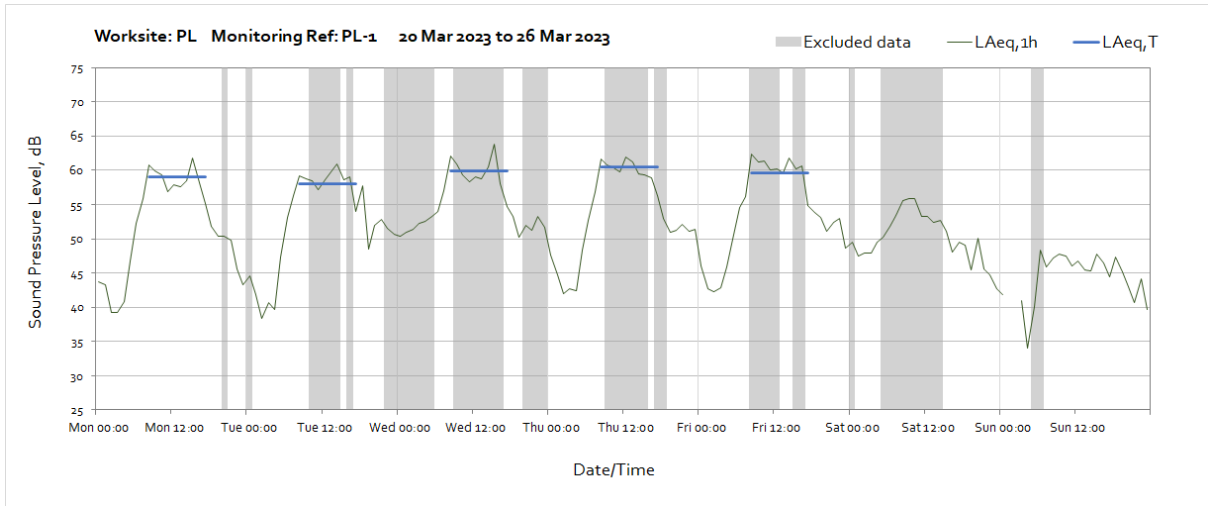
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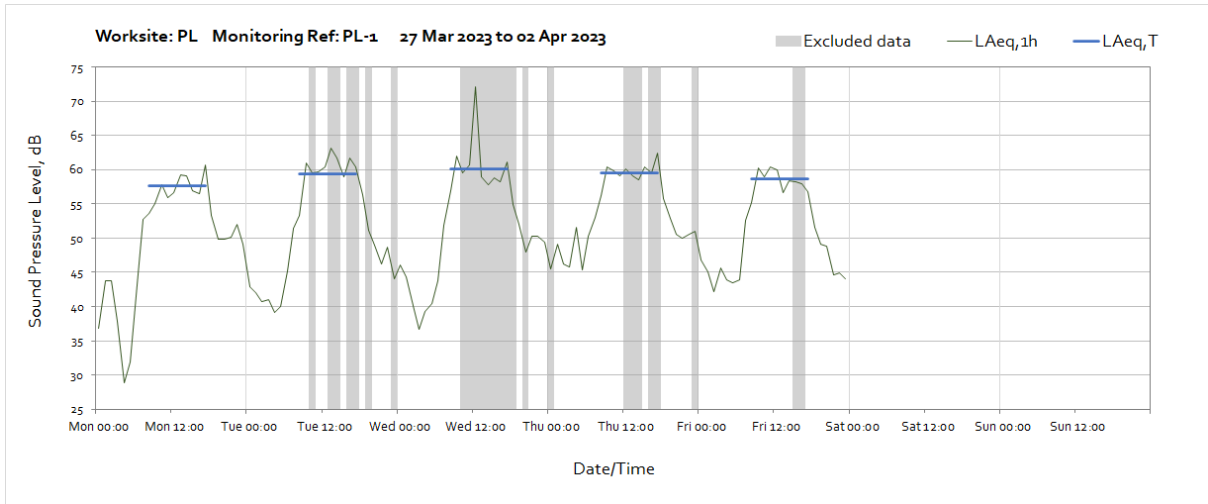
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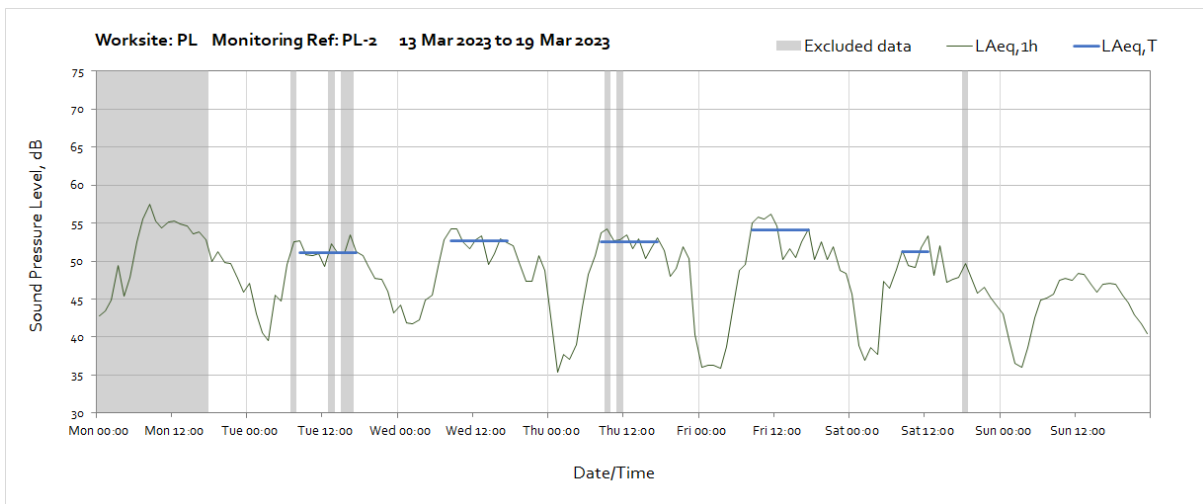
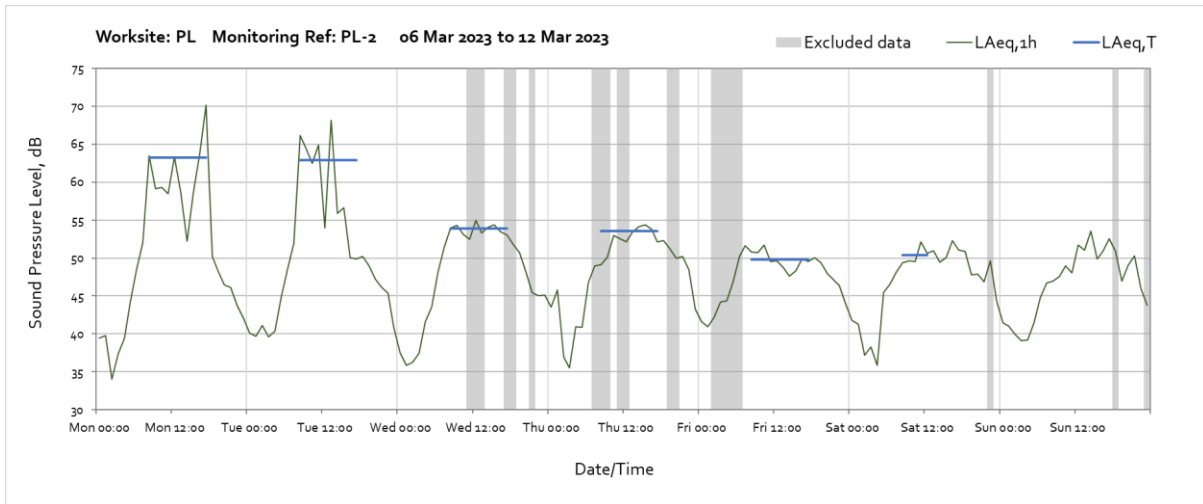
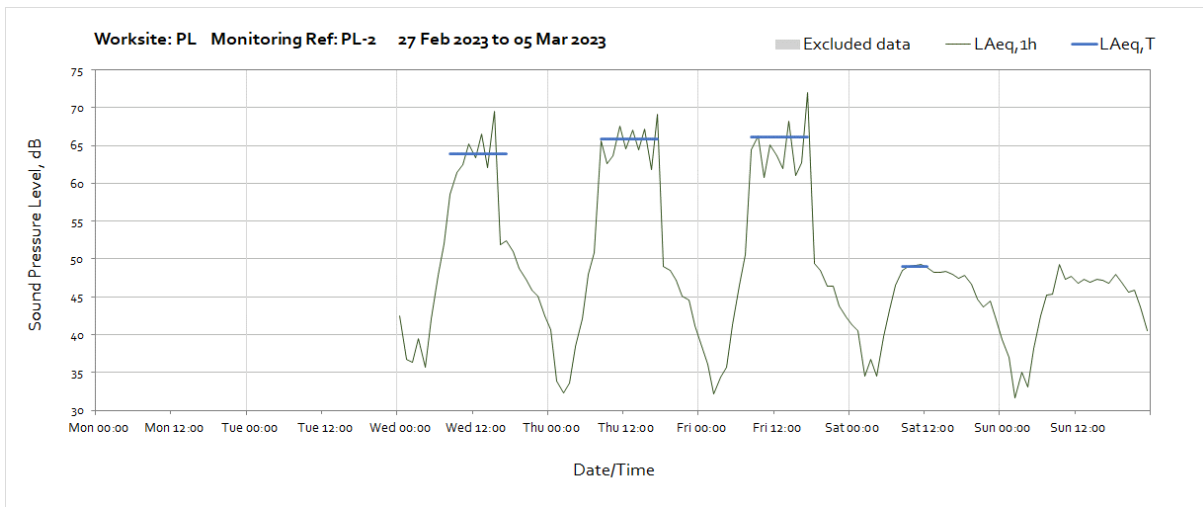
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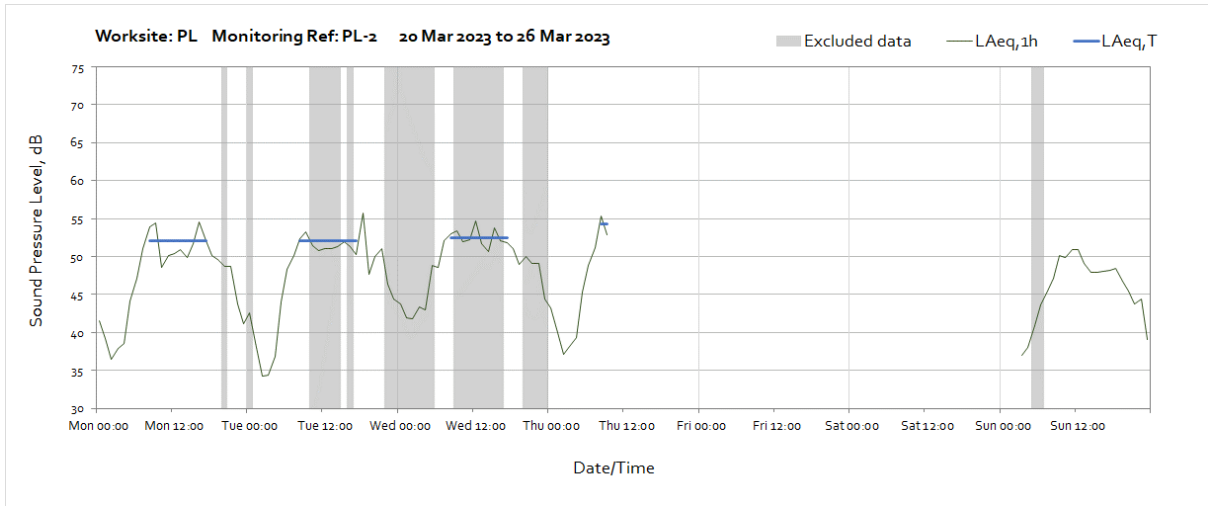


Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.

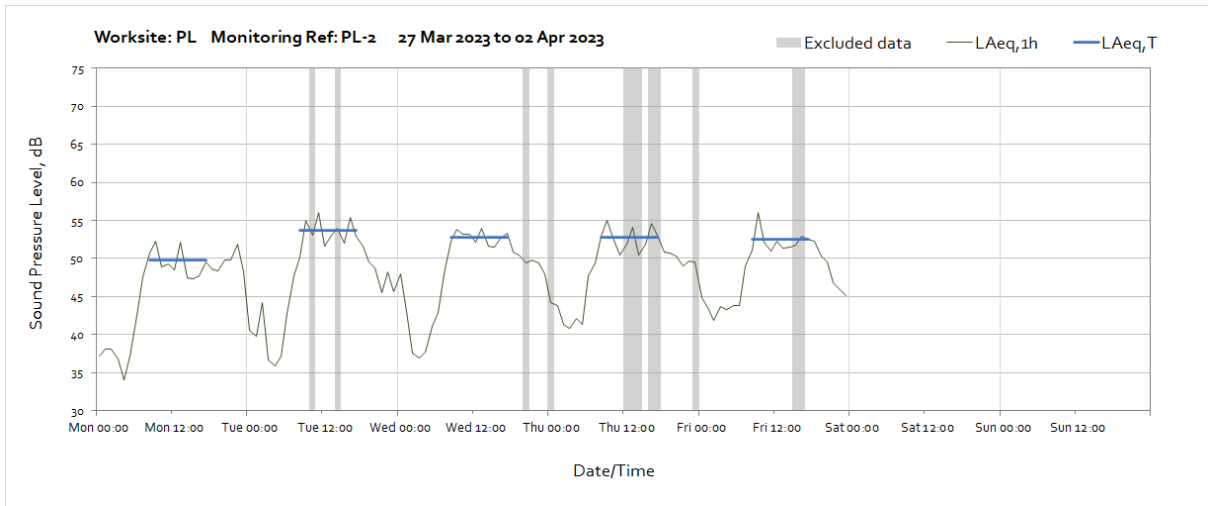


Worksite: PL – Monitoring Ref: PL-2

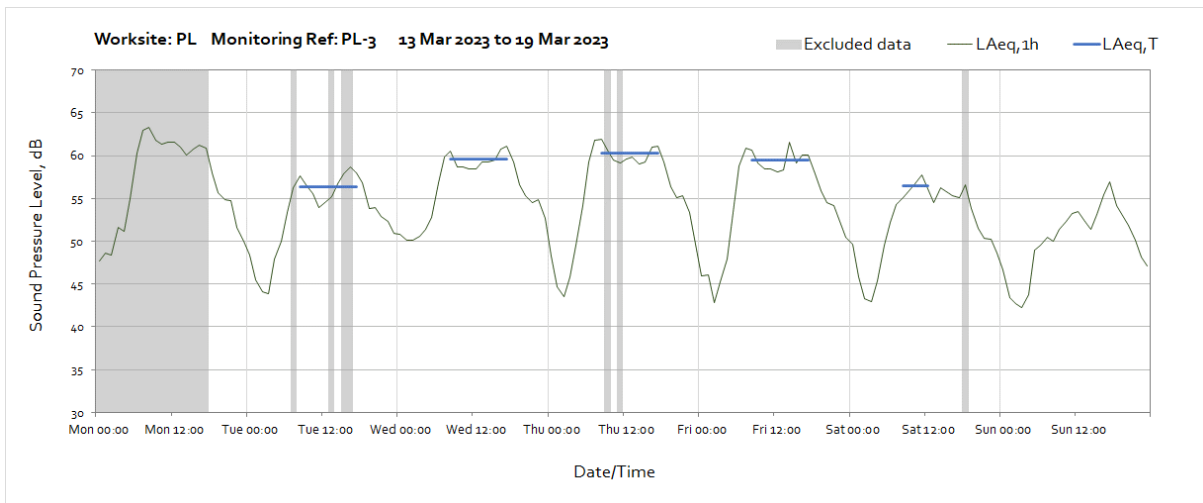
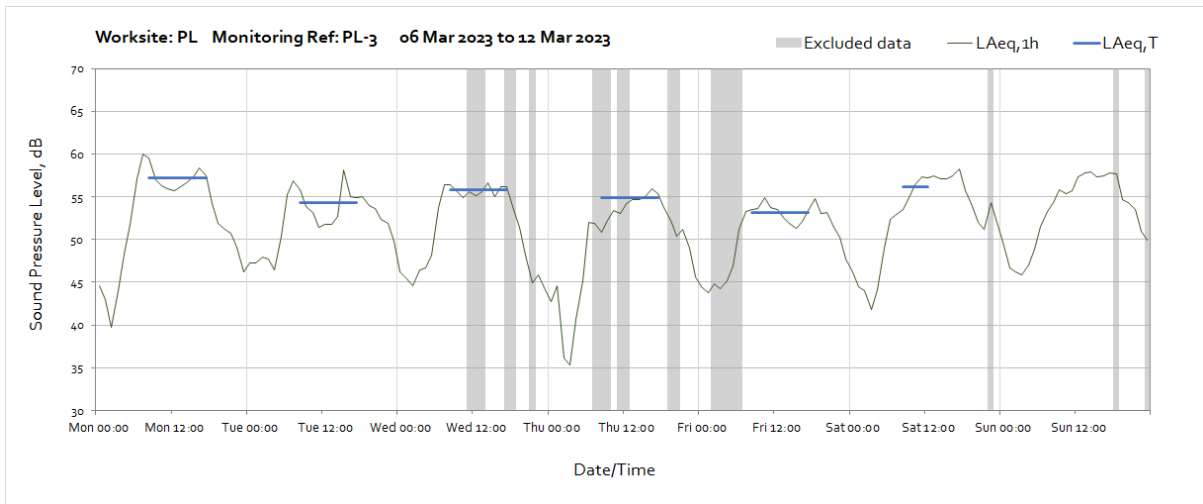
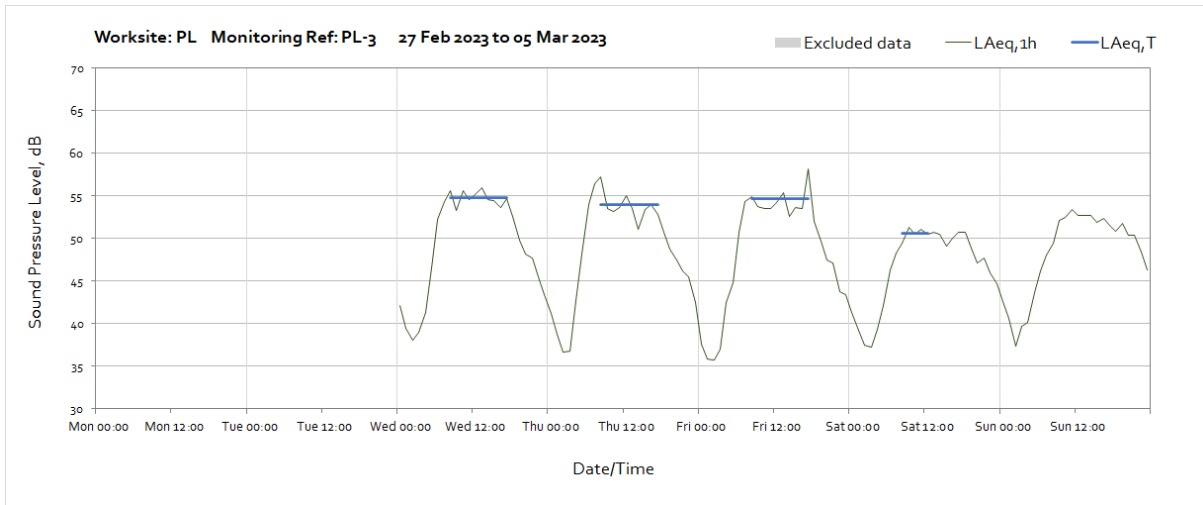




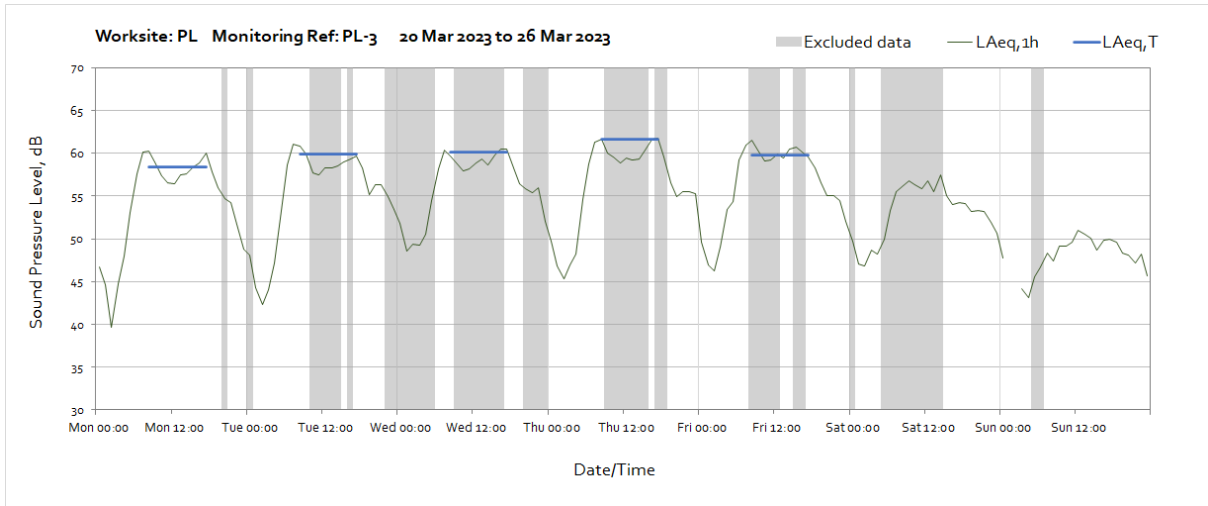
Note: The reason for missing data between 10:00 on Thursday 23rd March and 03:00 on Sunday 26th March is under investigation.



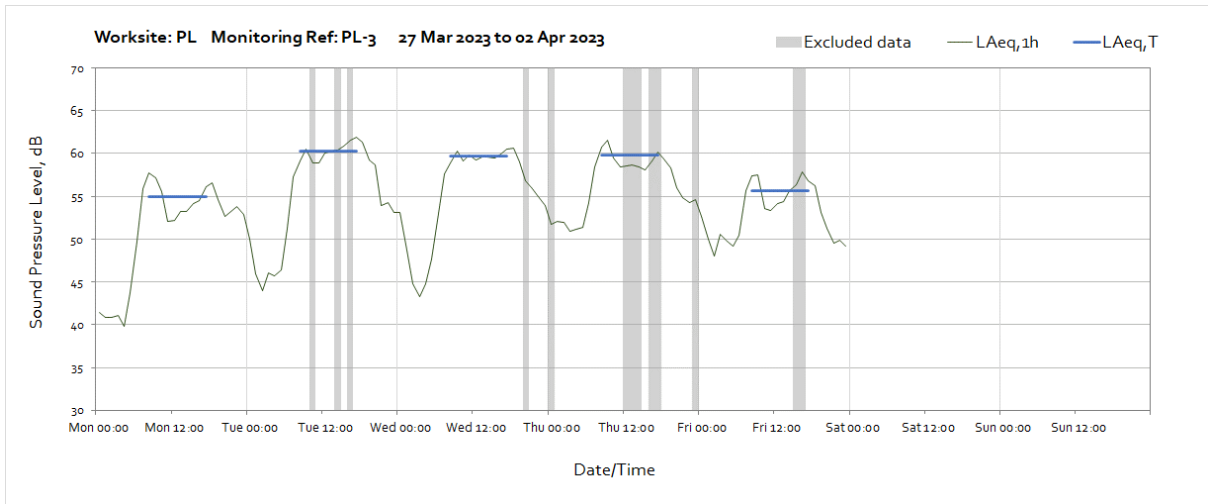
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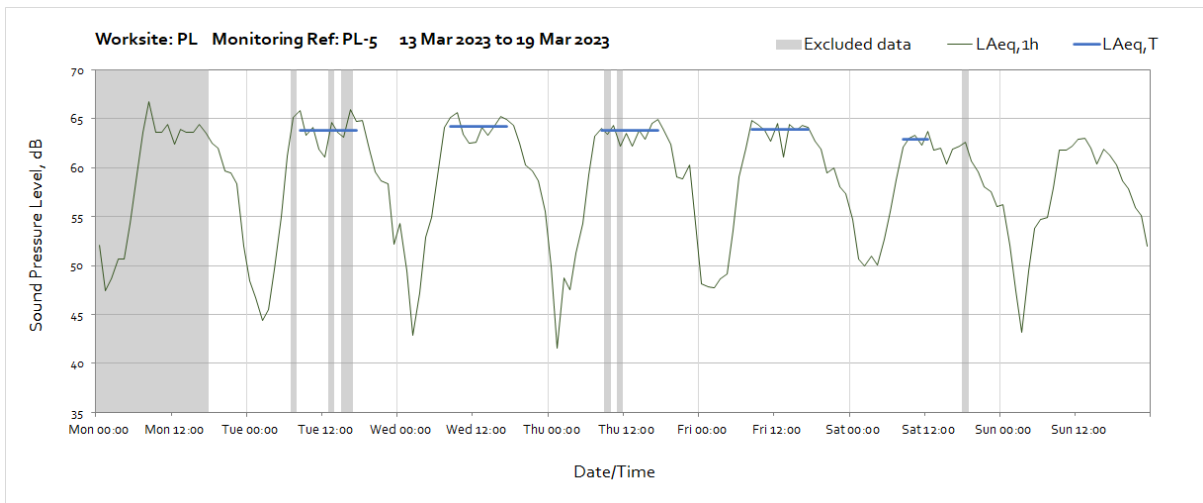
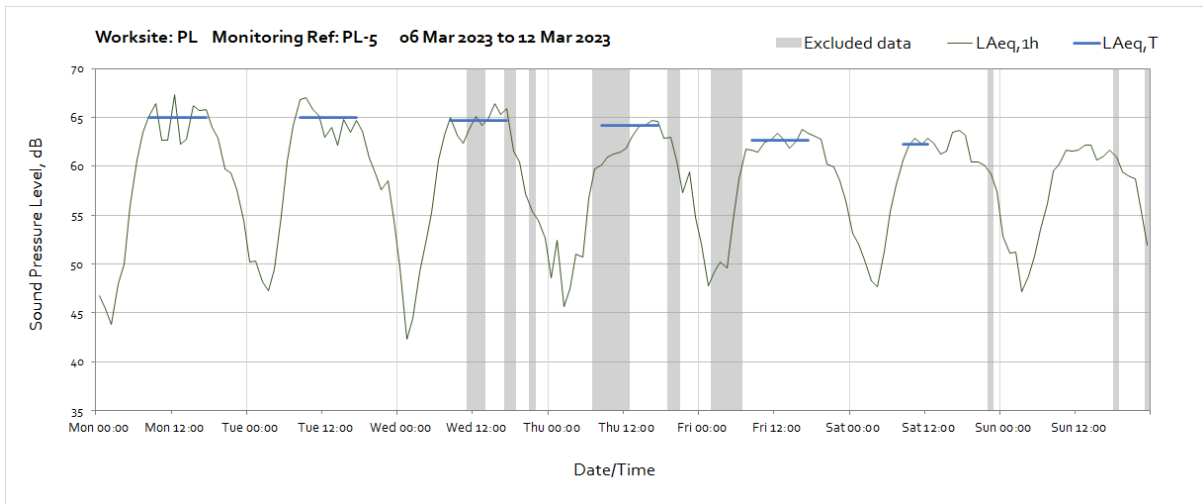
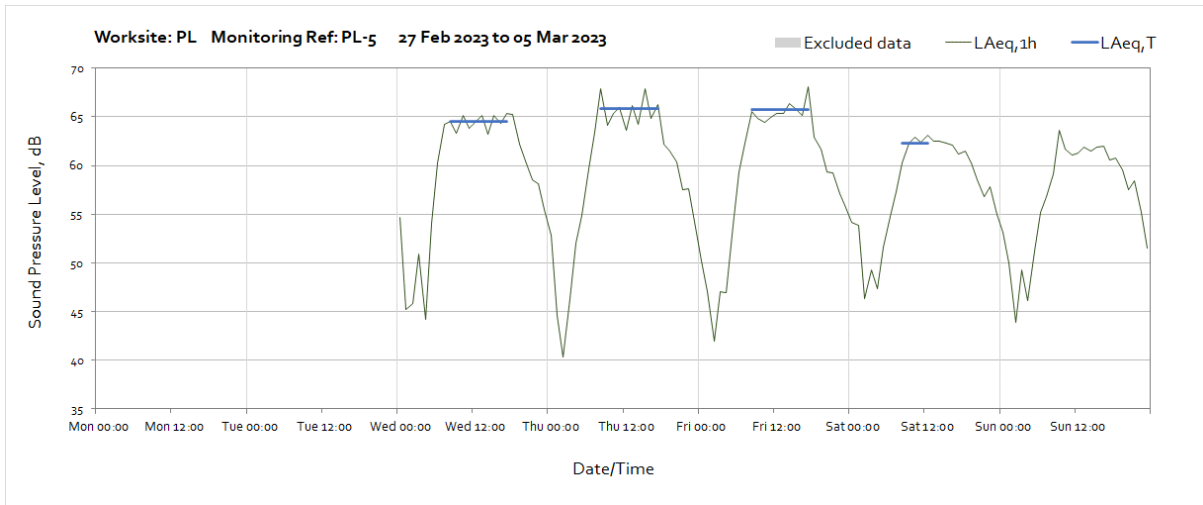
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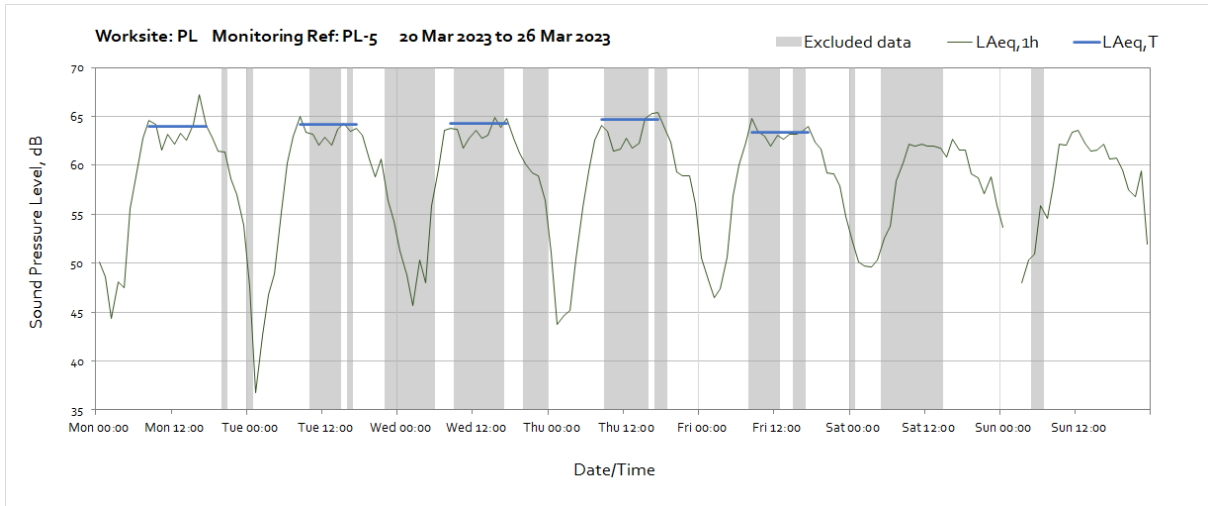
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.



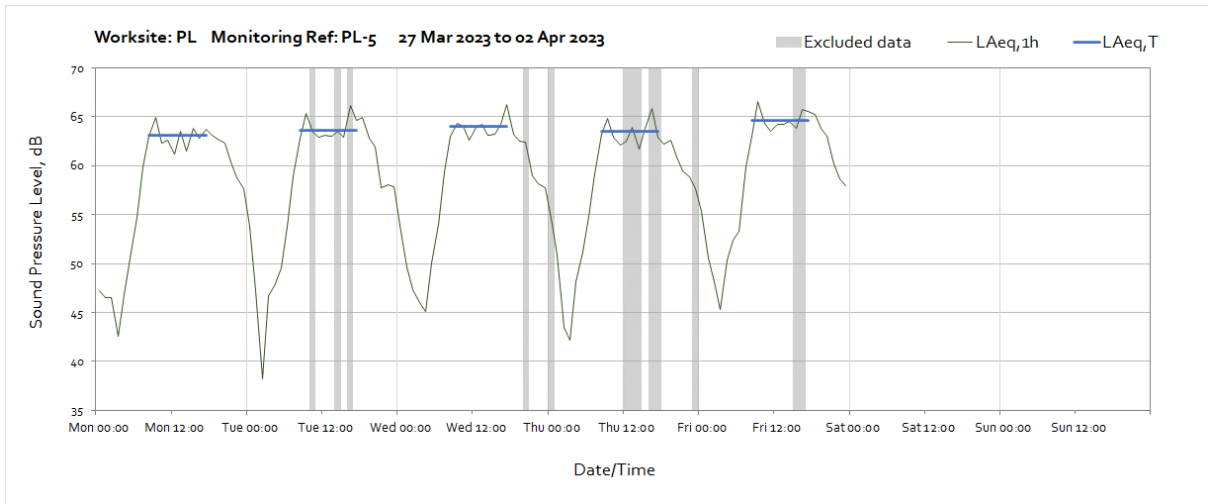
Worksite: PL – Monitoring Ref: PL-5



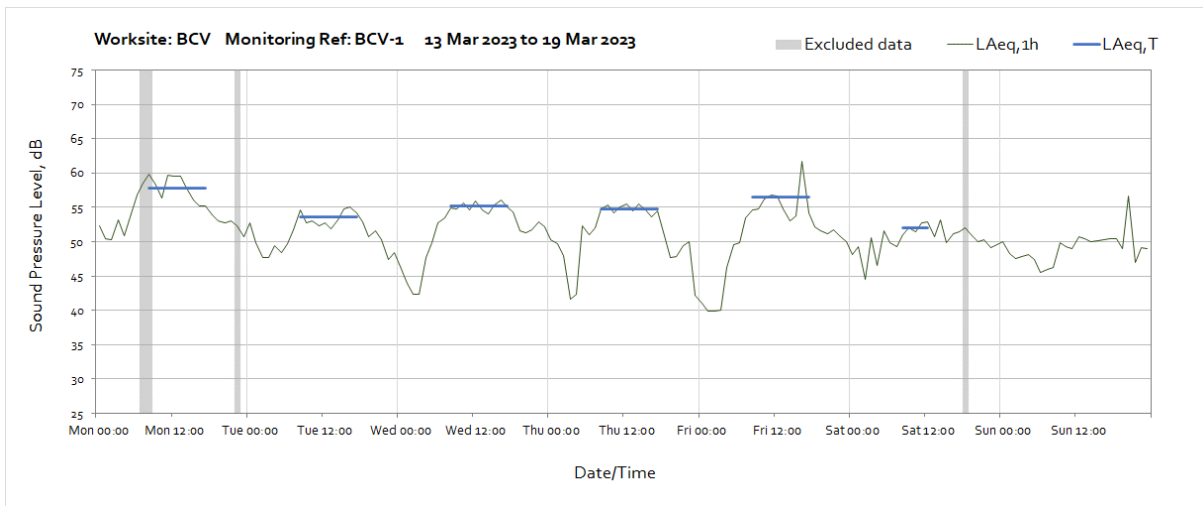
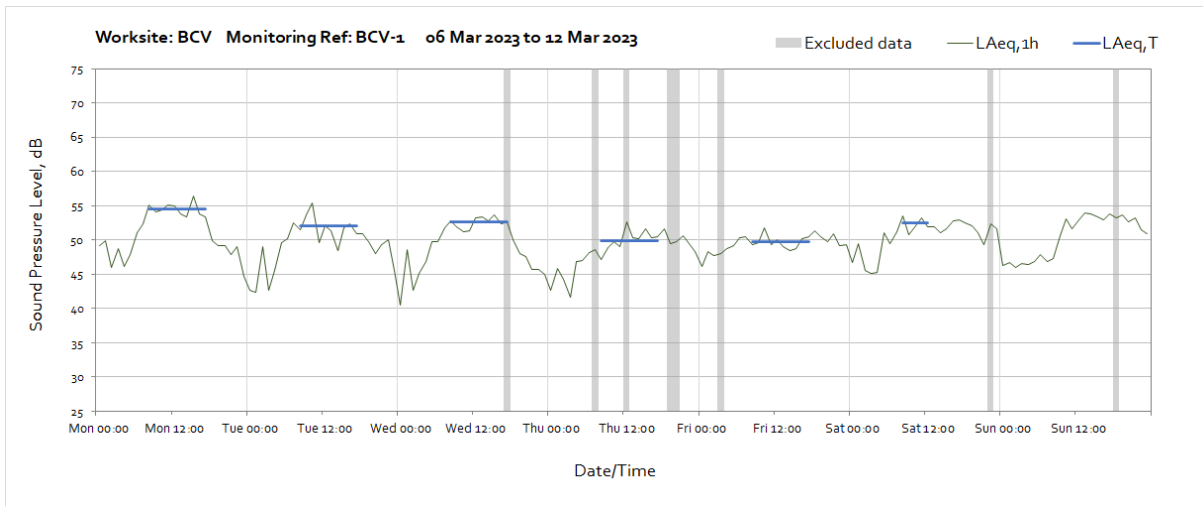
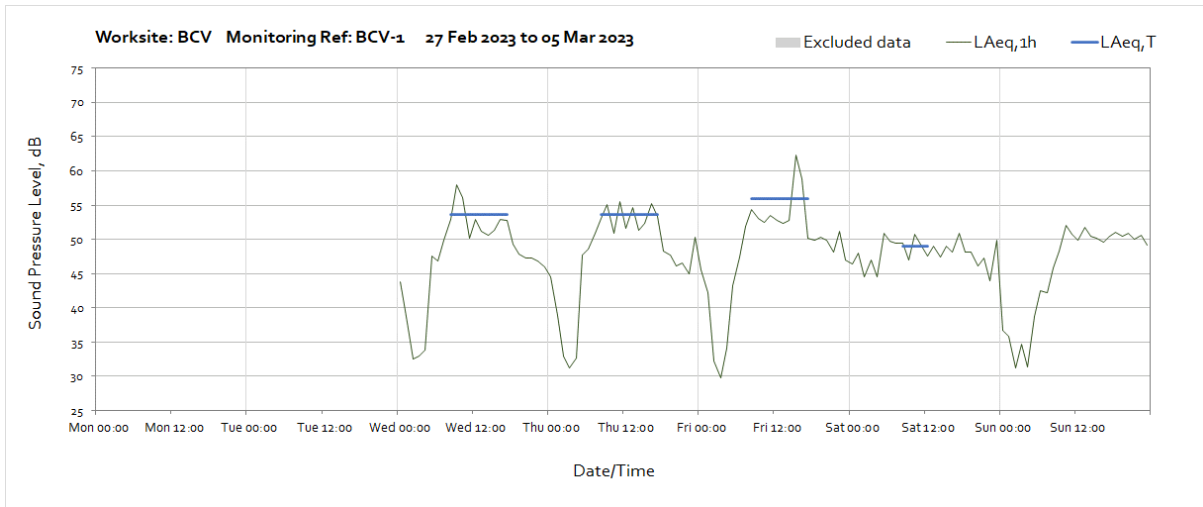
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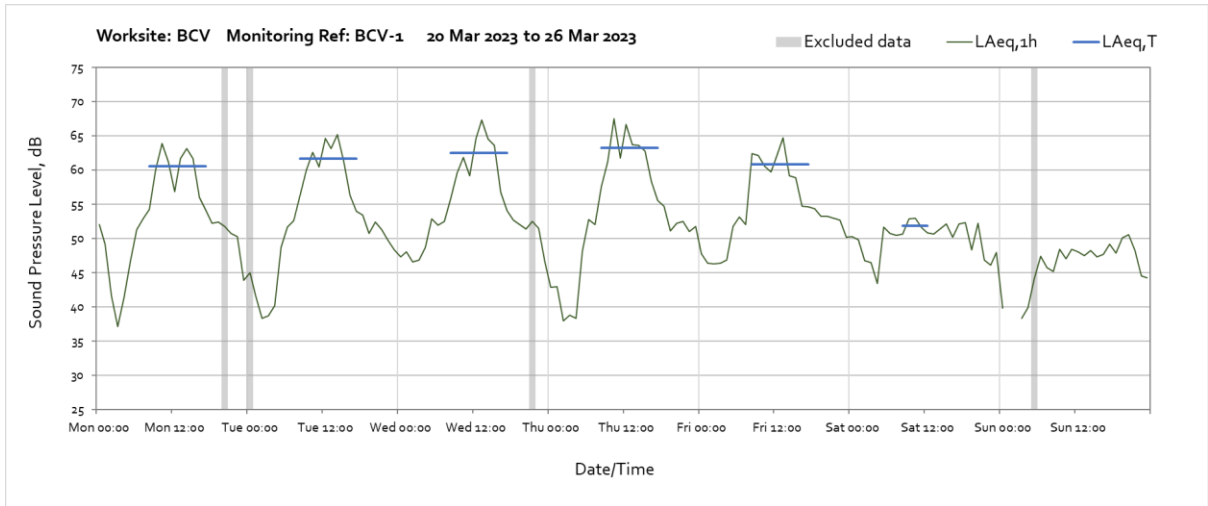


Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.

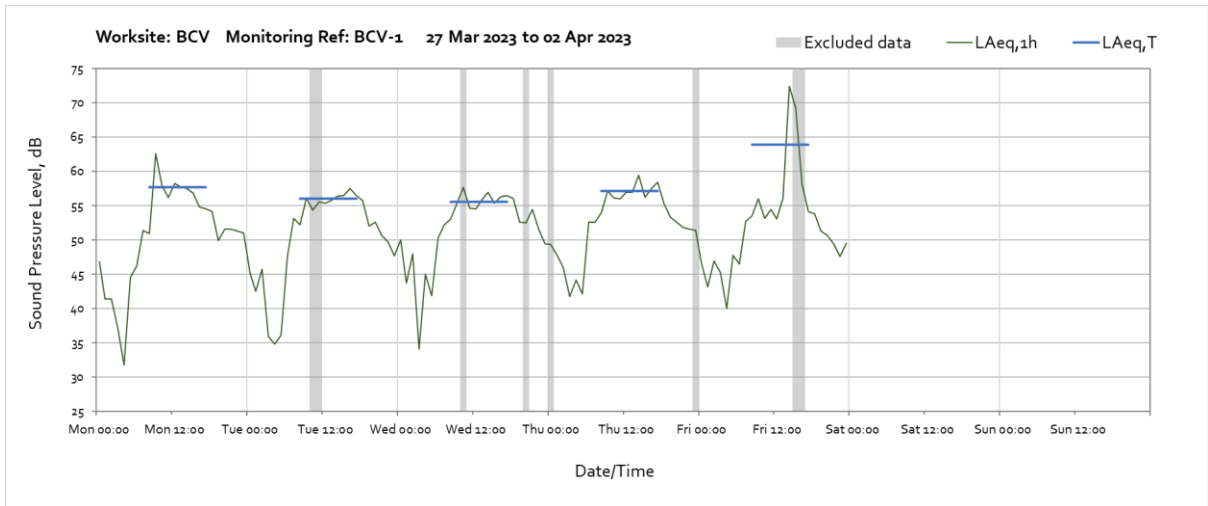


Worksite: BCV – Monitoring Ref: BCV-1

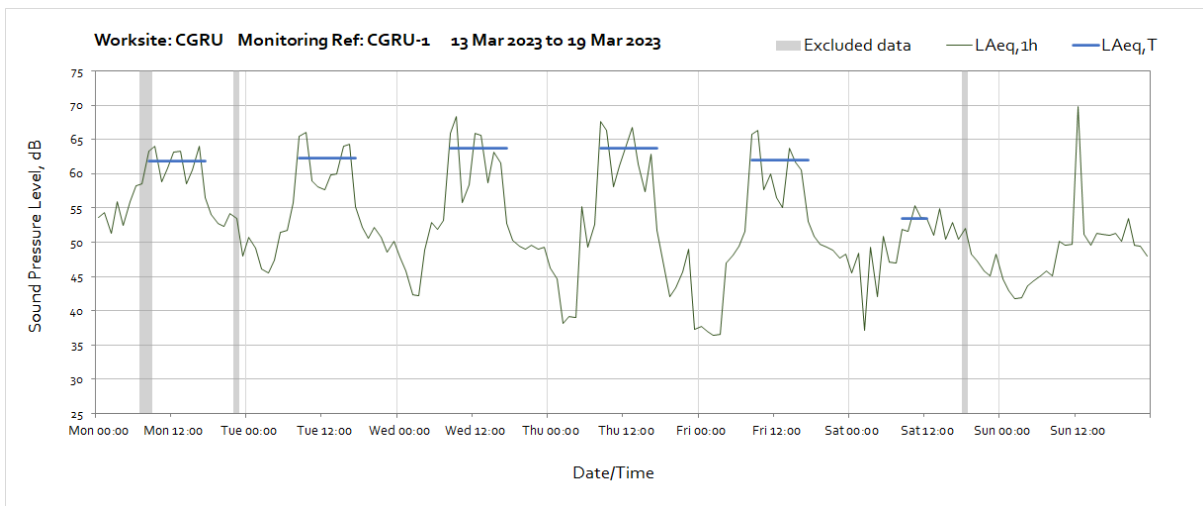
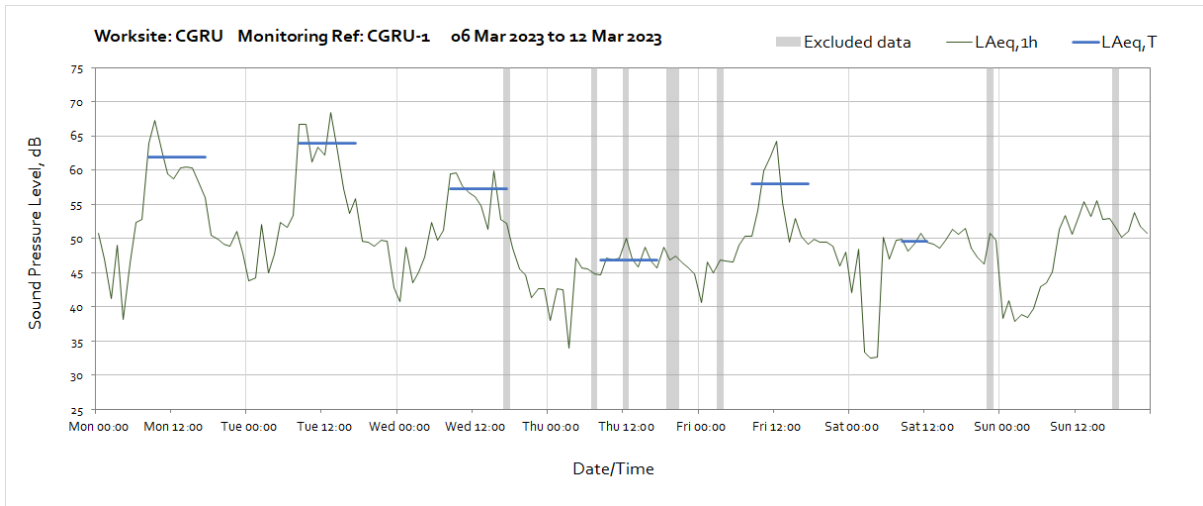
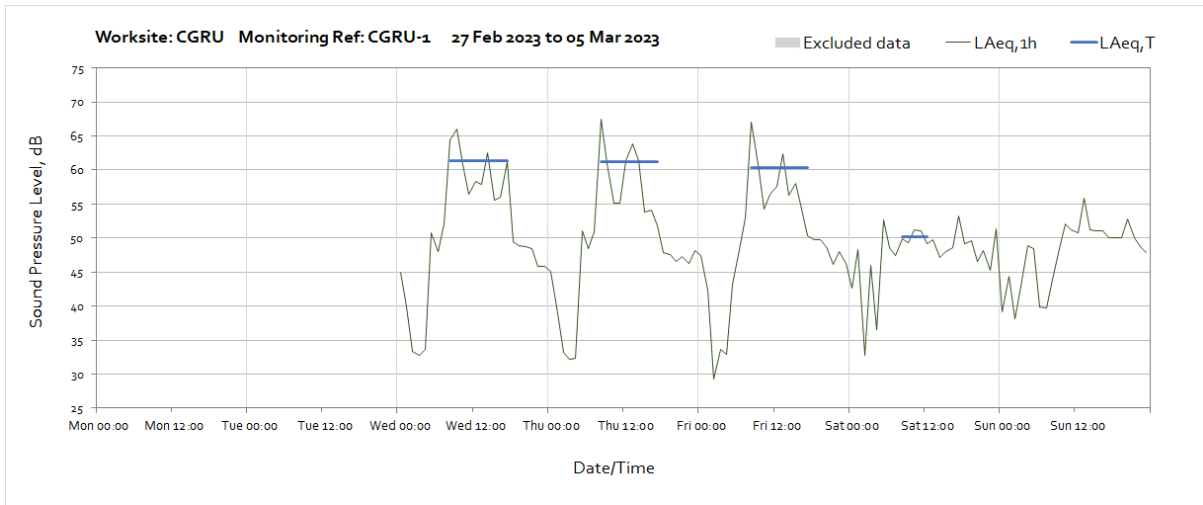




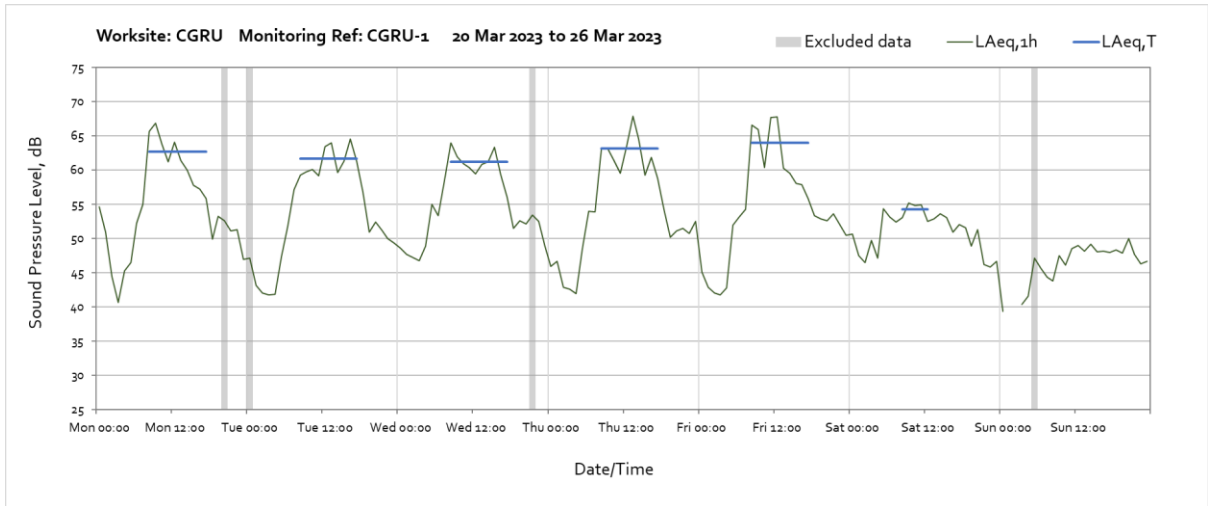
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.



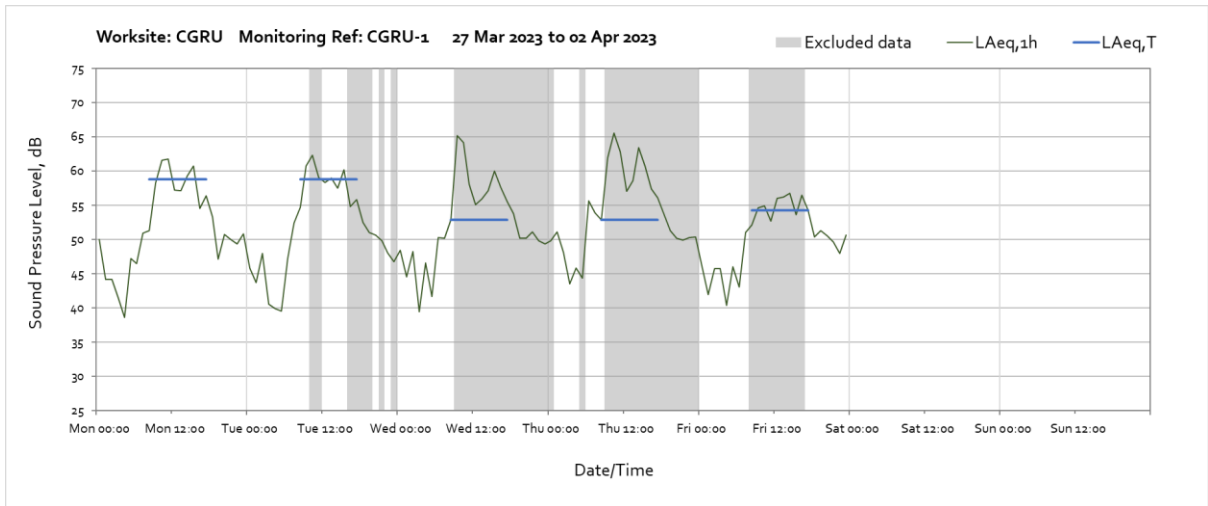
Worksite: CGRU- Monitoring Ref: CGRU-1



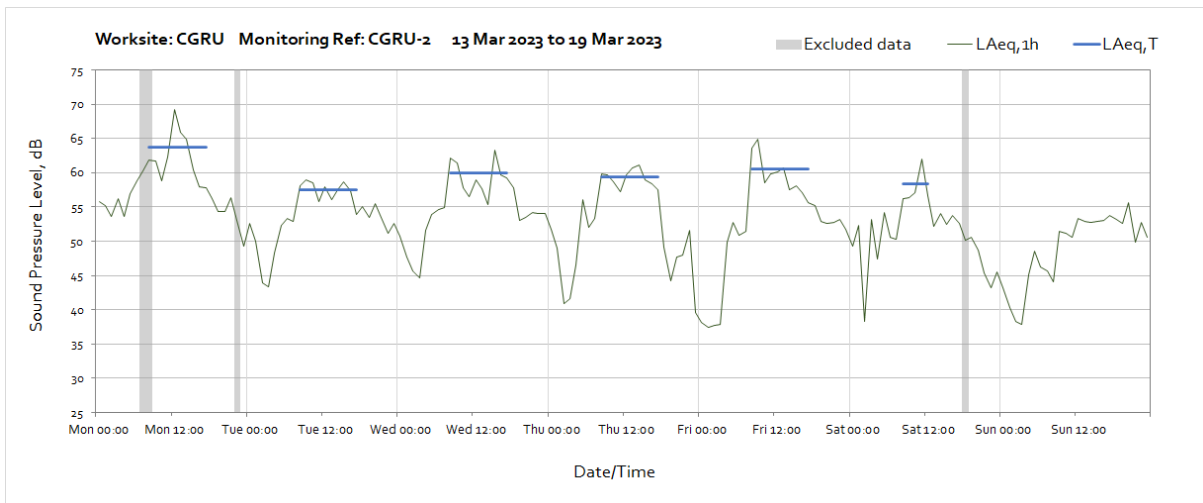
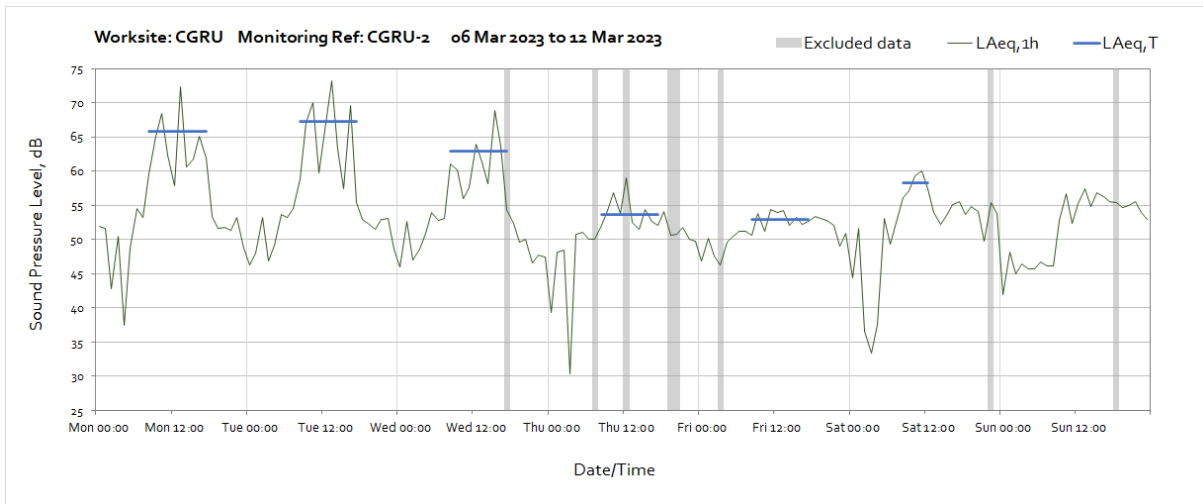
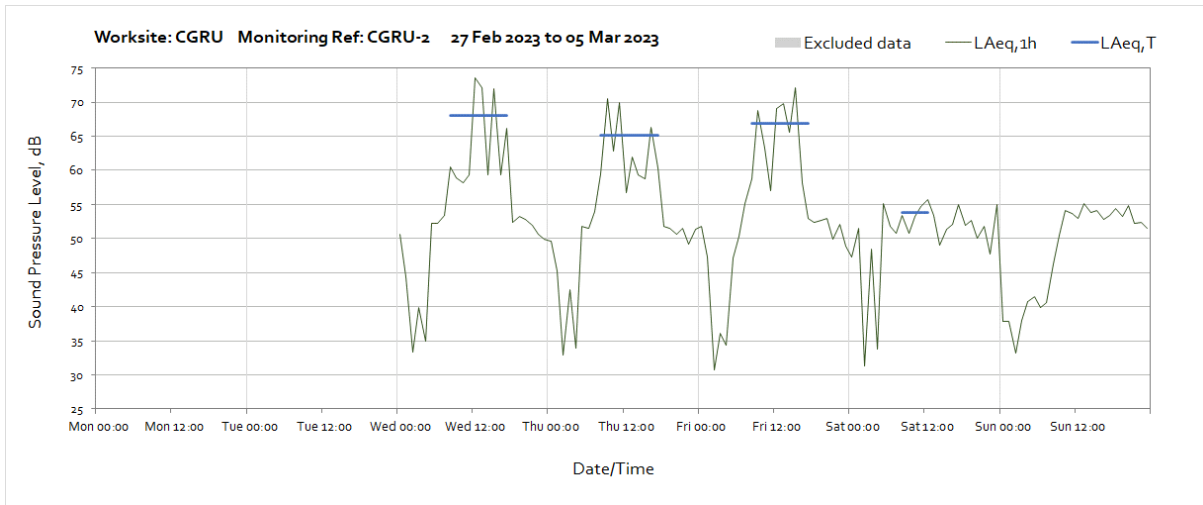
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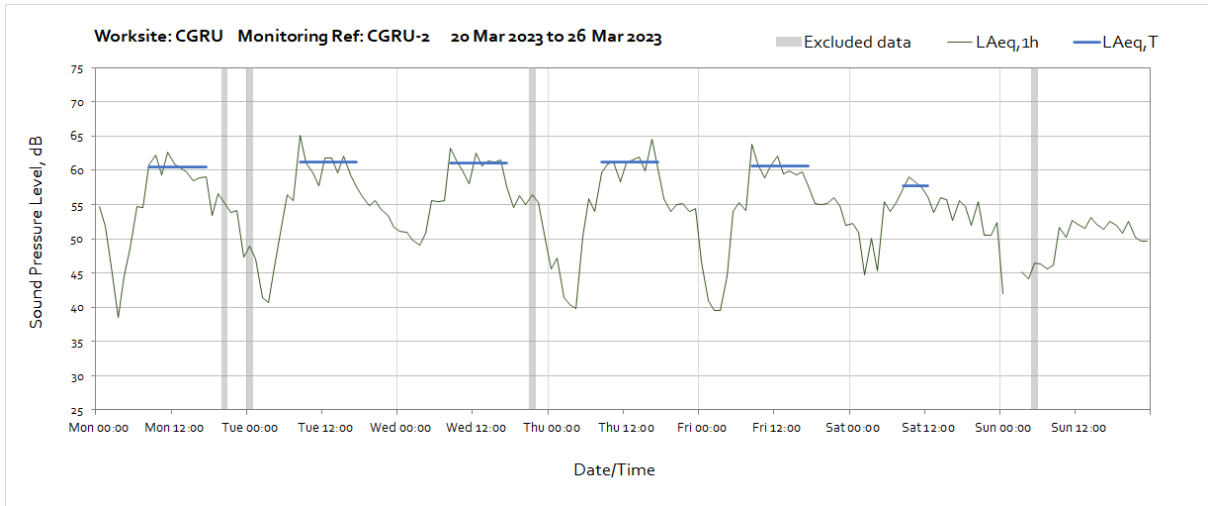
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.



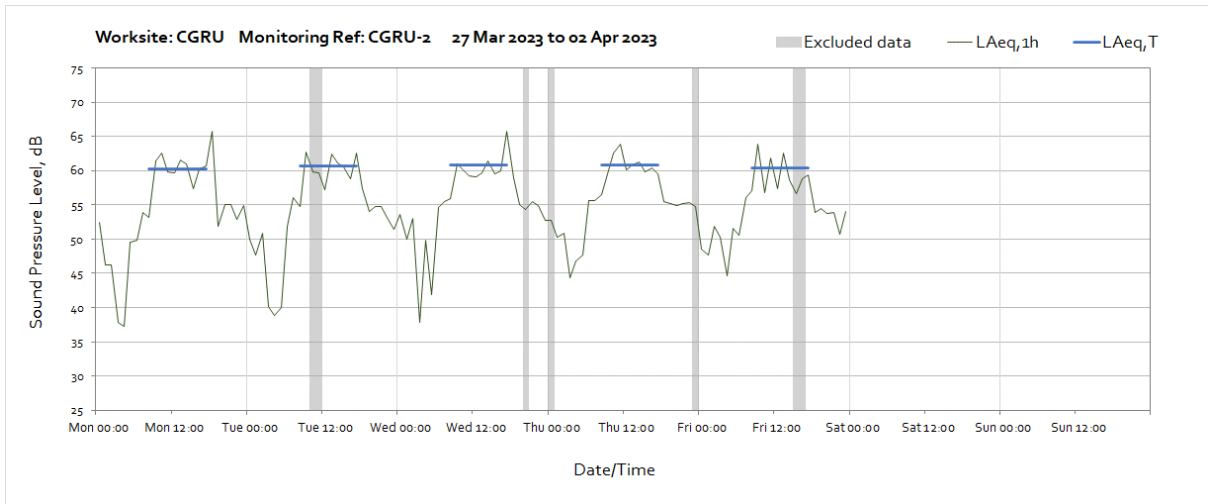
Worksite: CGRU- Monitoring Ref: CGRU-2



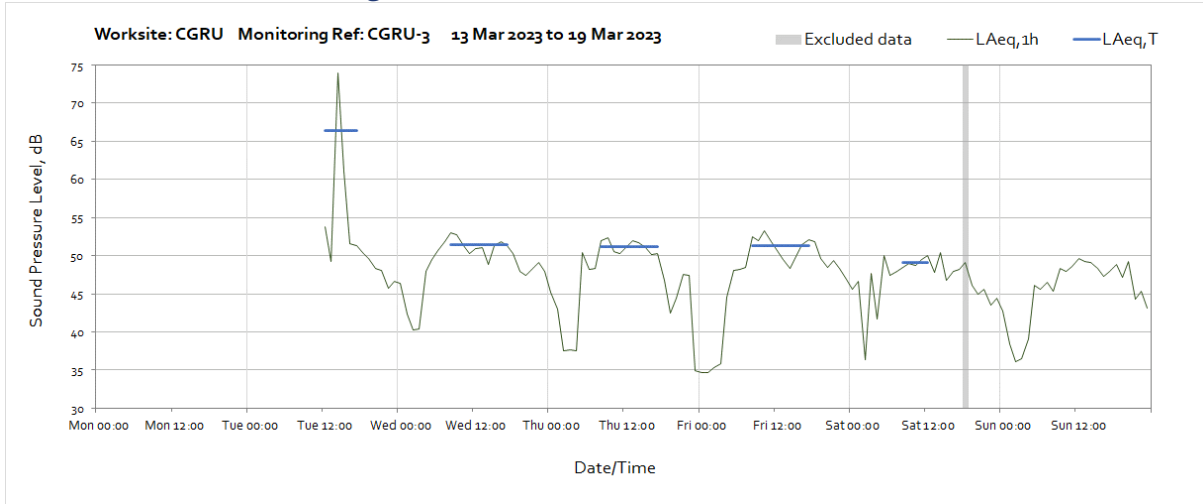
OFFICIAL



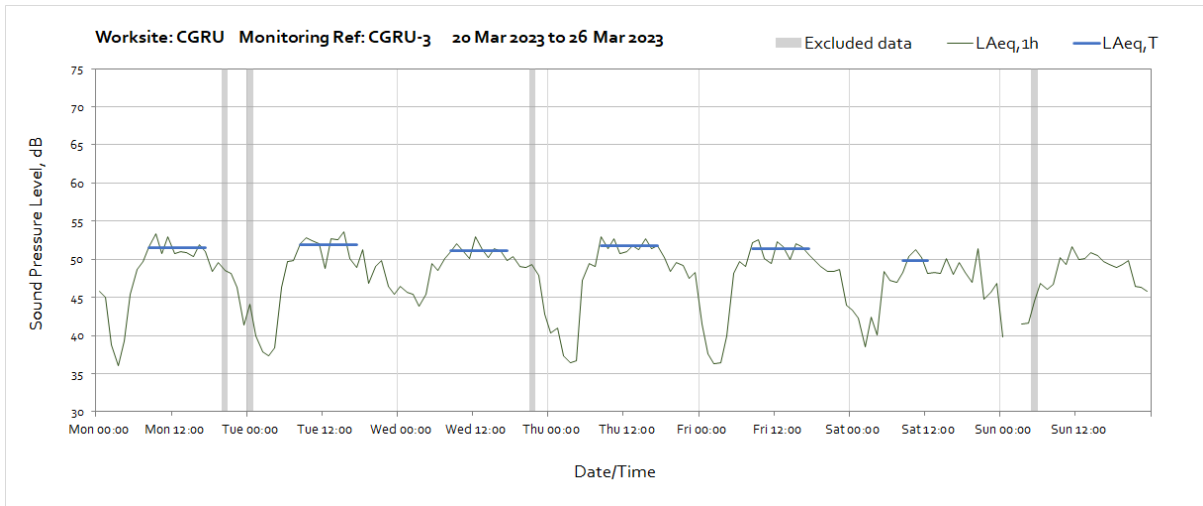
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.



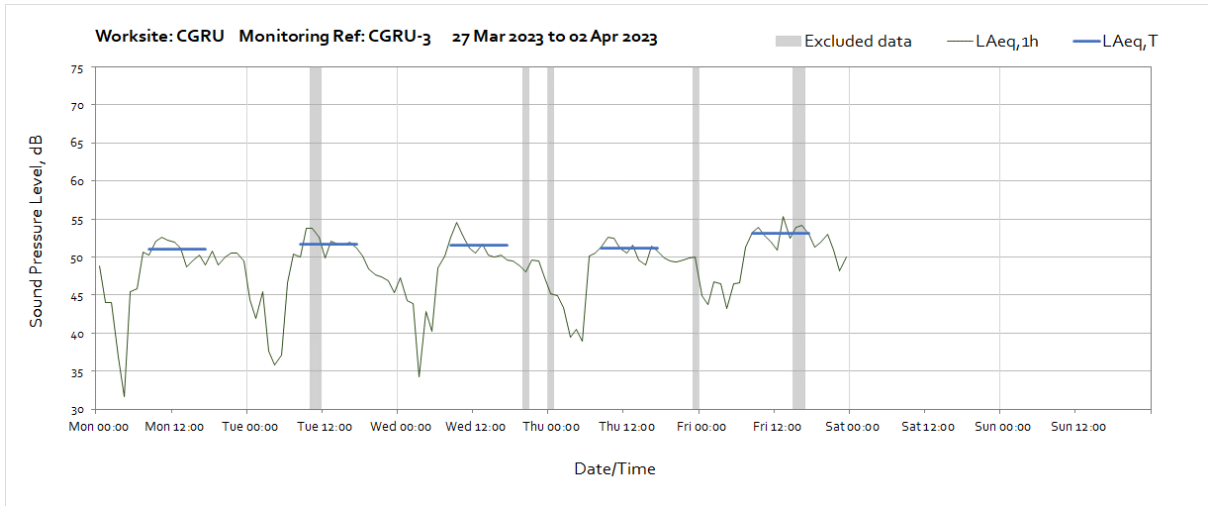
Worksite: CGRU- Monitoring Ref: CGRU-3



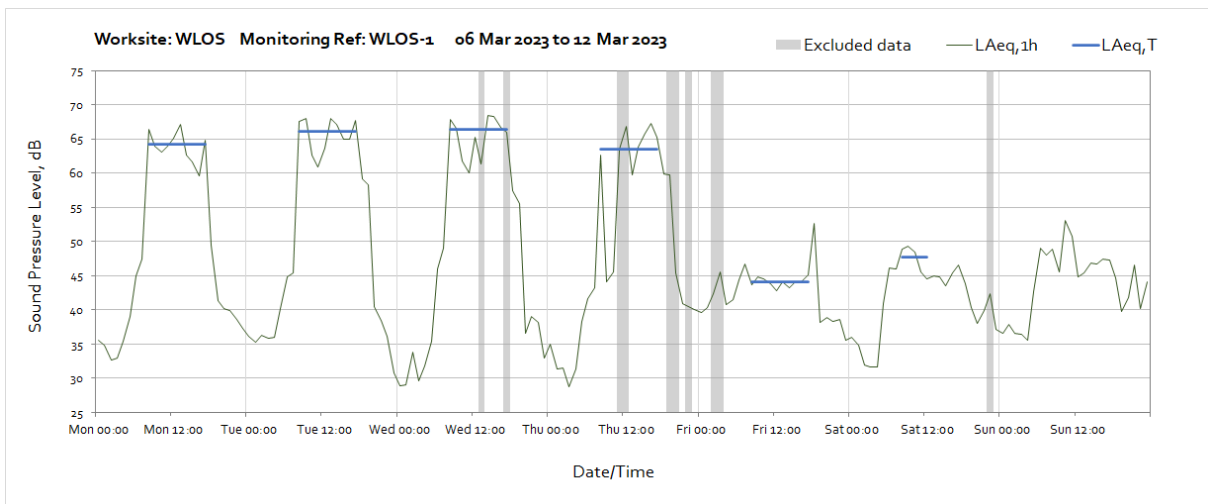
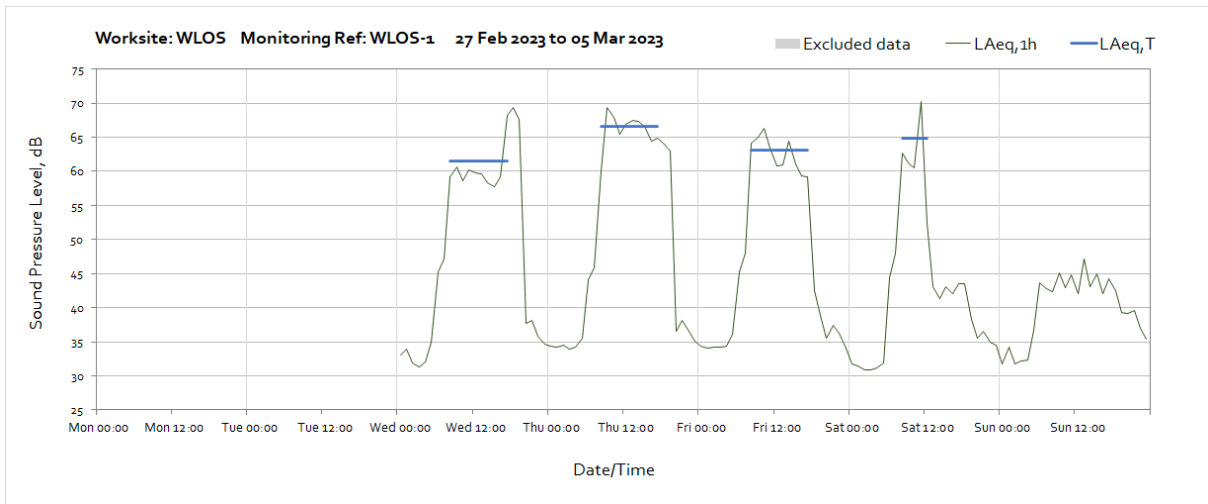
Note: Noise monitor installed at 12:00 on 14th March

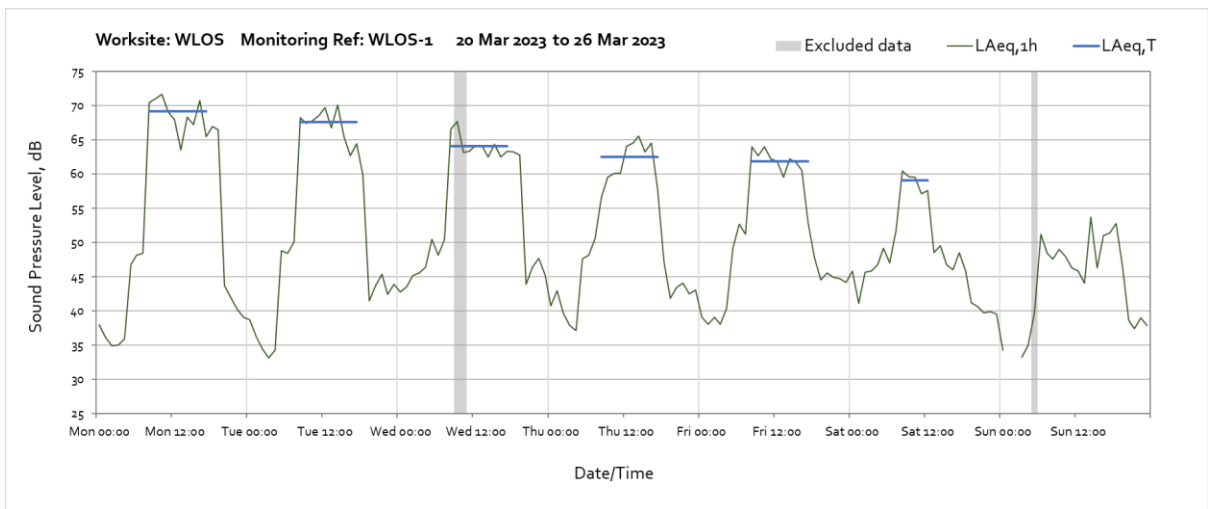
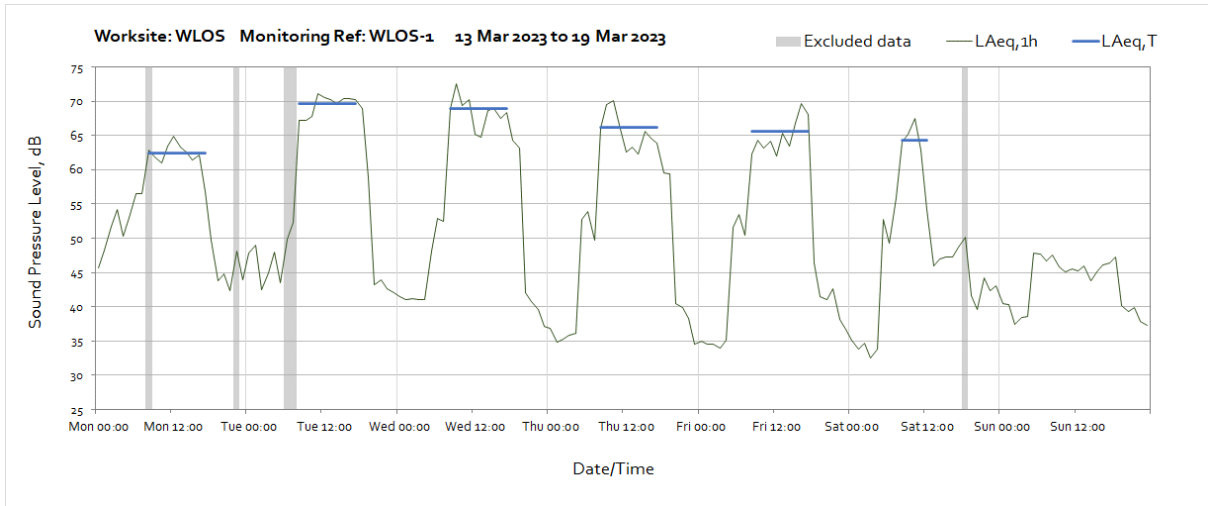


Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.

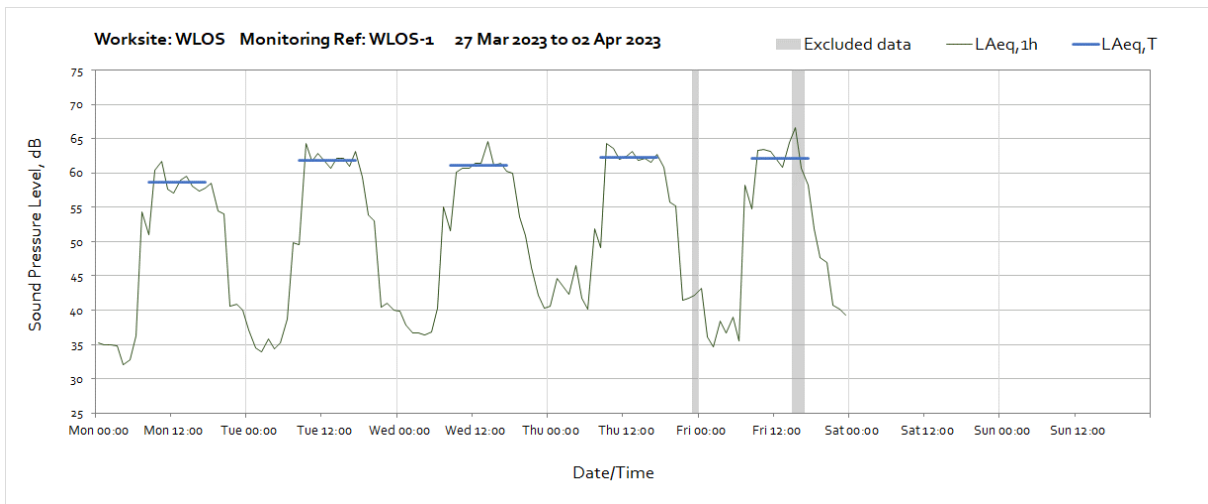


Worksite: WLOS - Monitoring Ref: WLOS-1

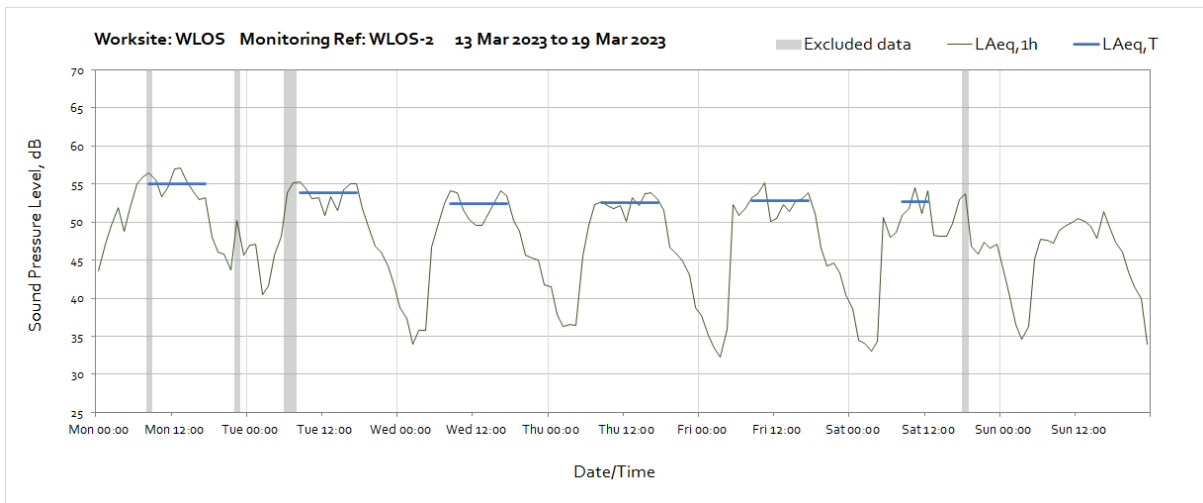
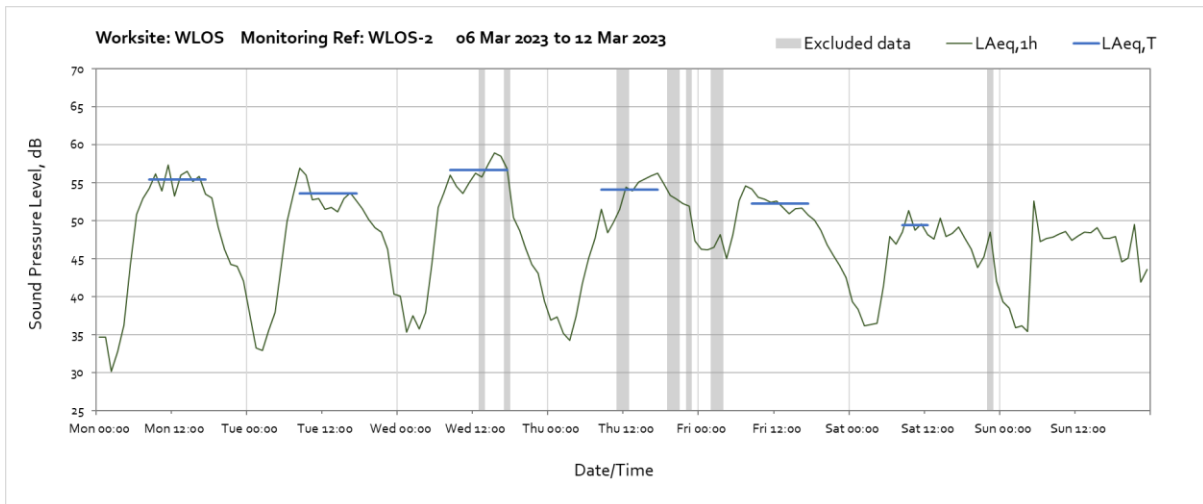
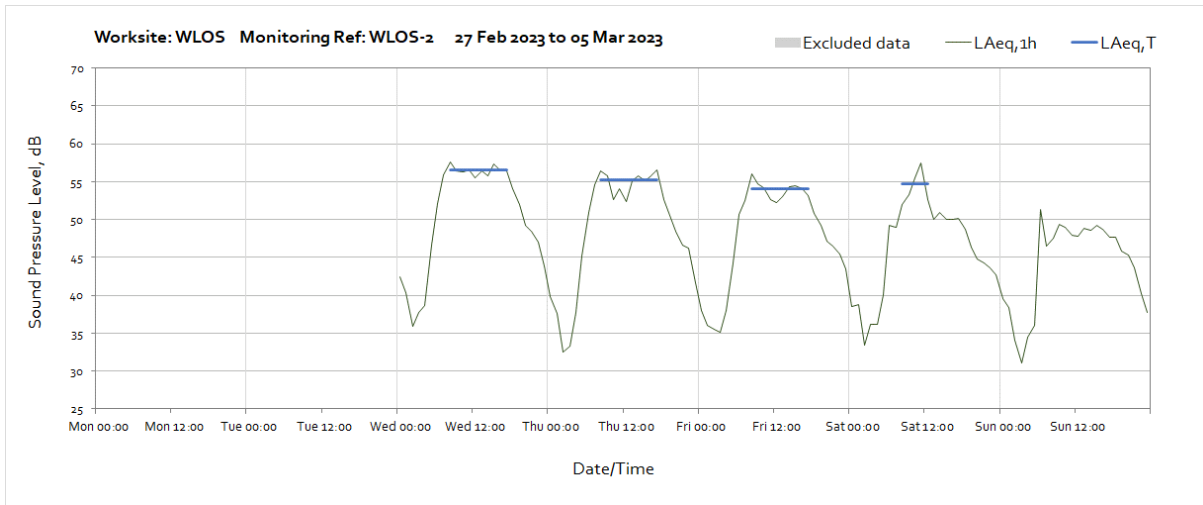




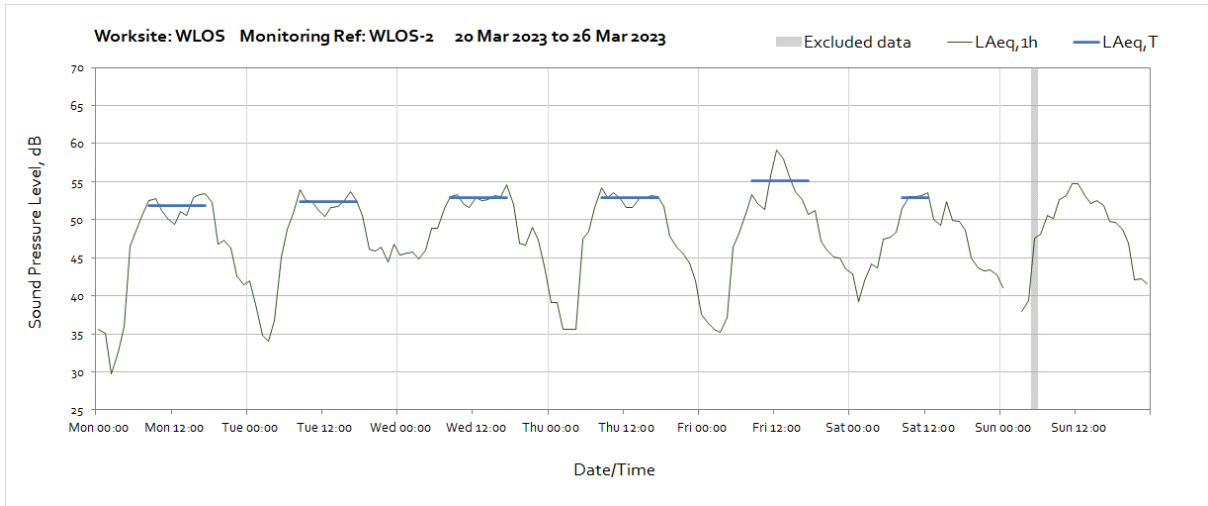
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.



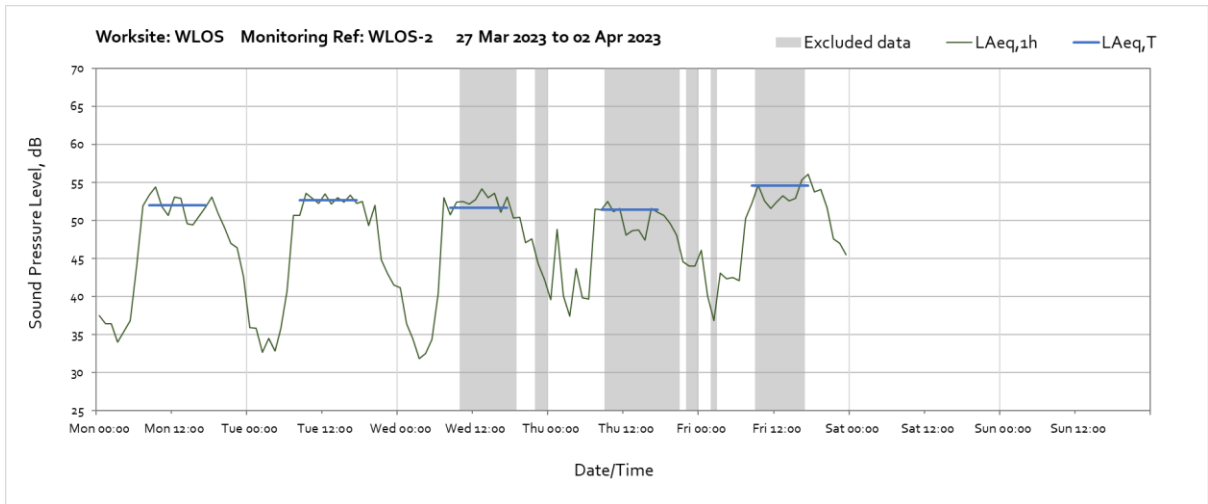
Worksite: WLOS - Monitoring Ref: WLOS-2



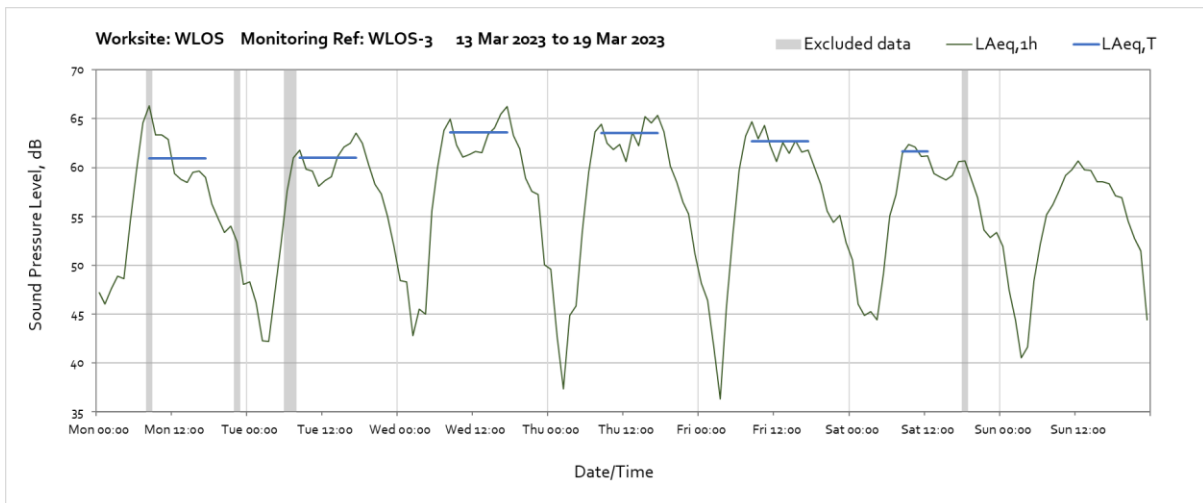
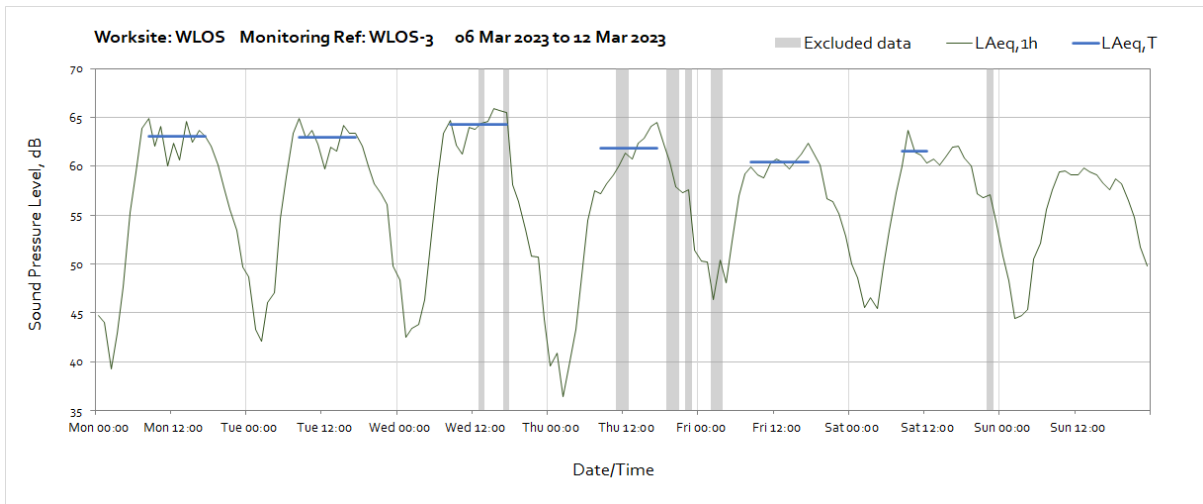
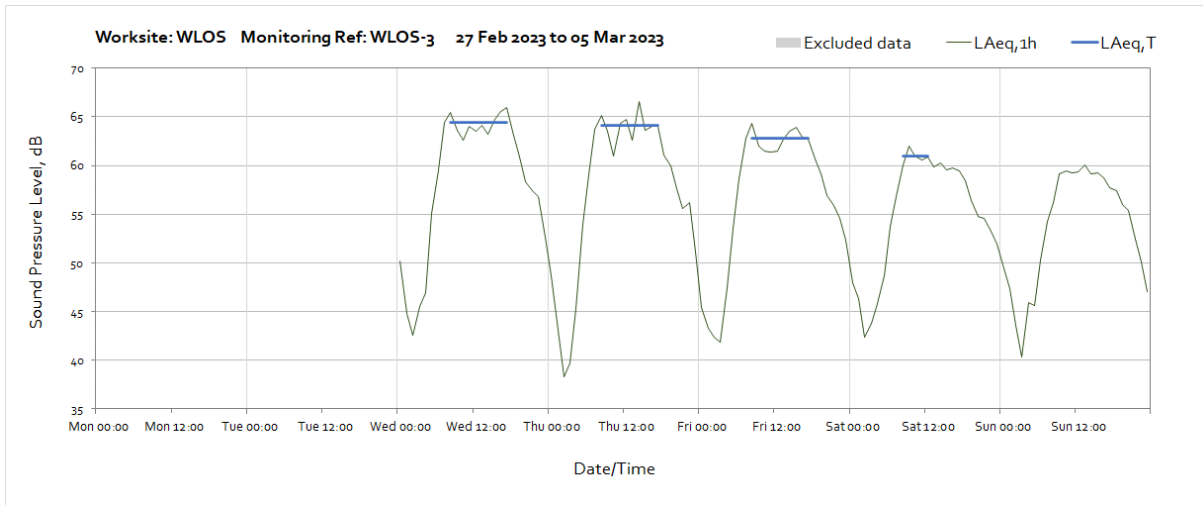
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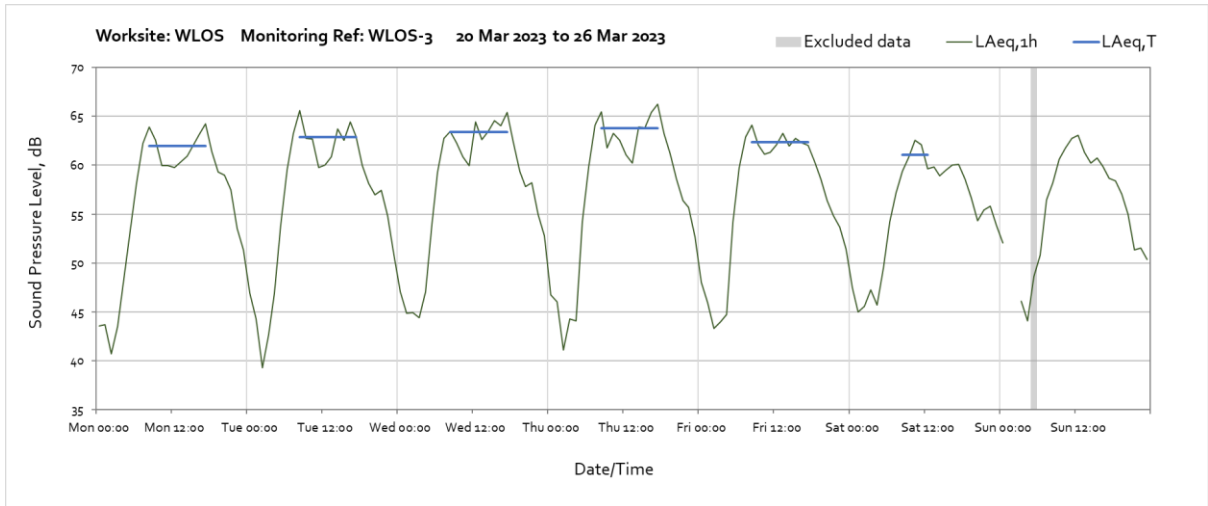
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.



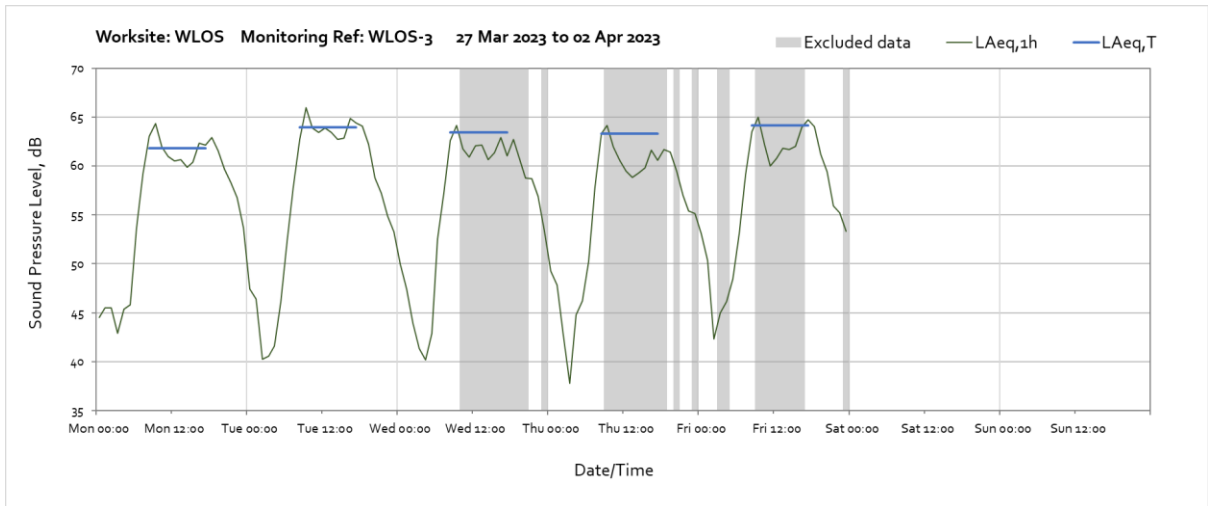
Worksite: WLOS - Monitoring Ref: WLOS-3



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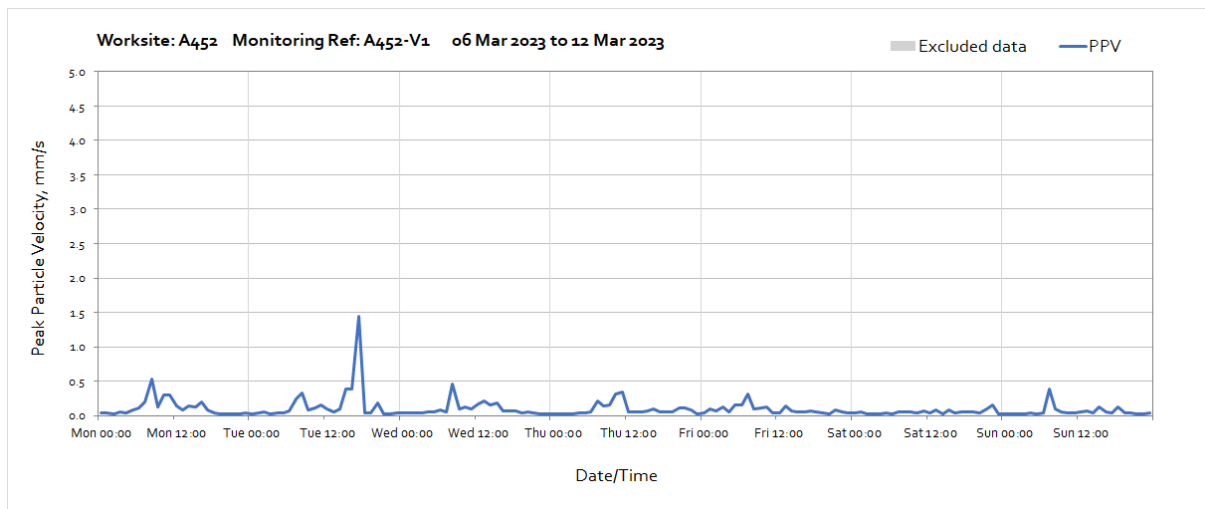
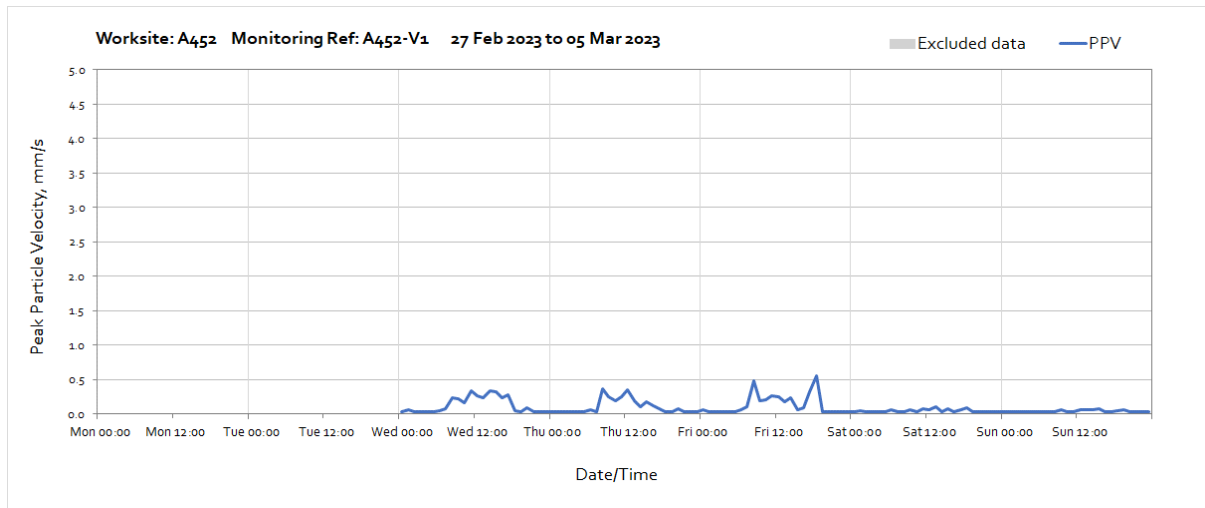
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.



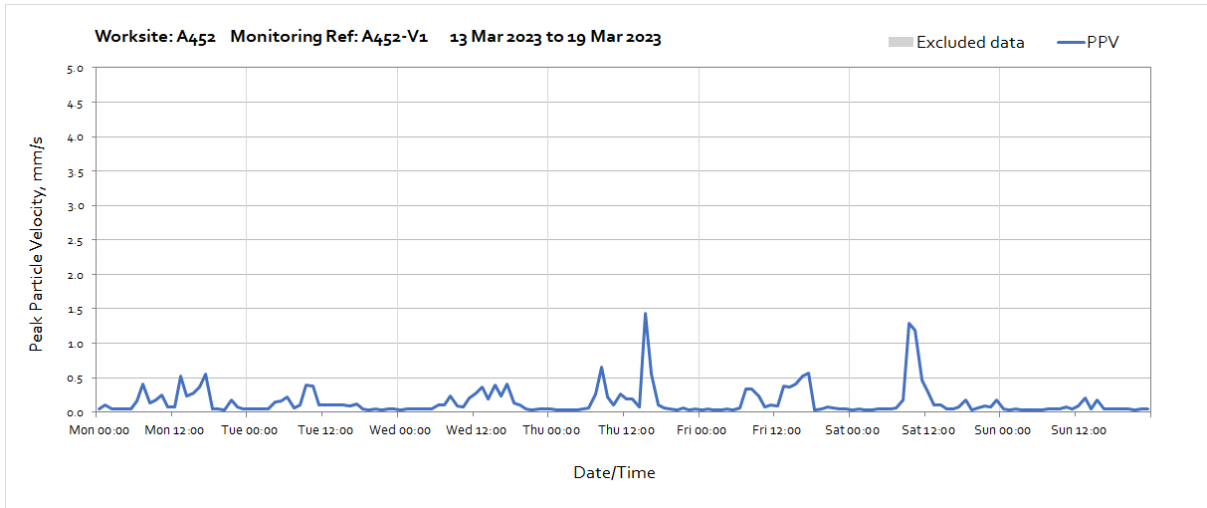
Vibration

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.

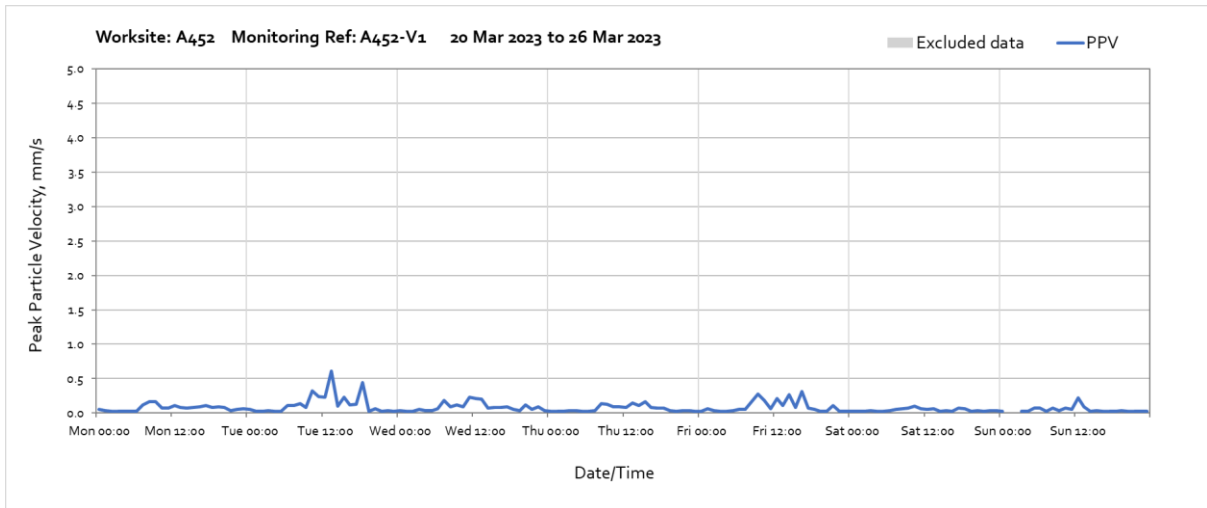
Worksite: A452 – Monitoring Ref: A452-V1



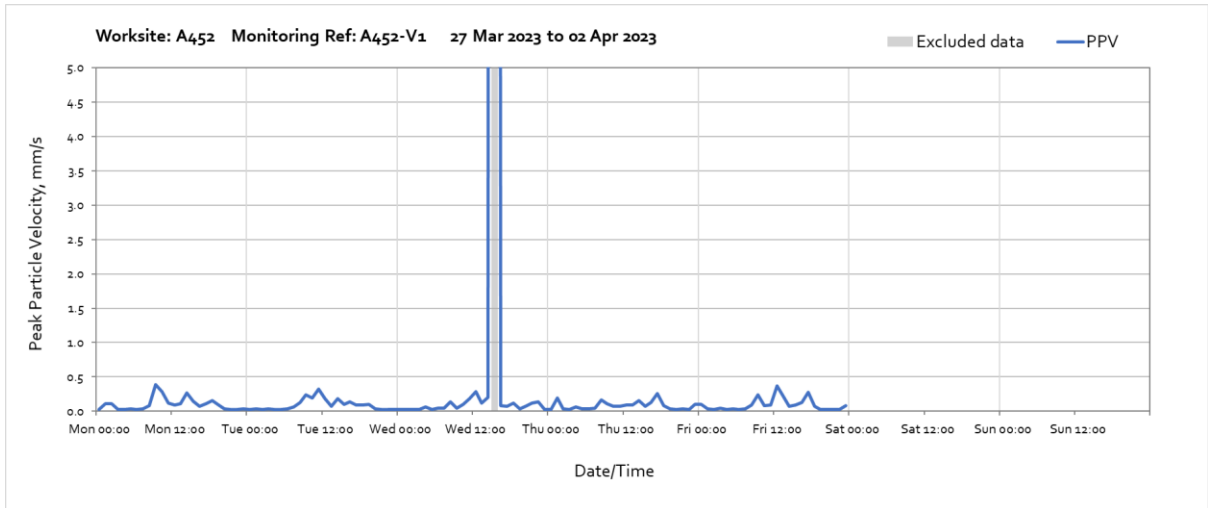
Note: High vibration levels measured at 17:00 on Tuesday 7th March was due to topsoil stripping and pond perimeter works in the vicinity of the monitor.



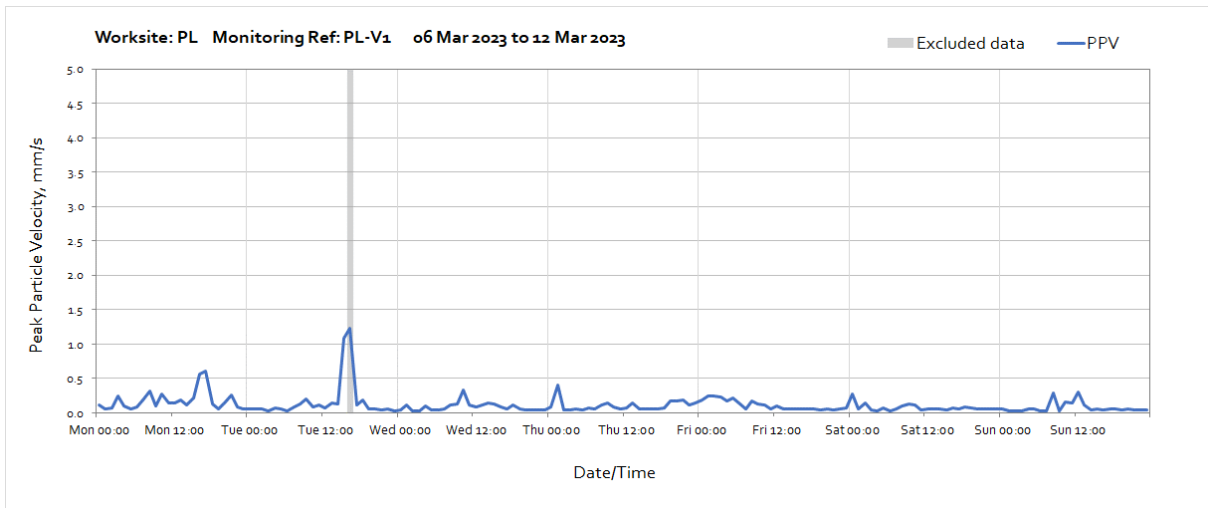
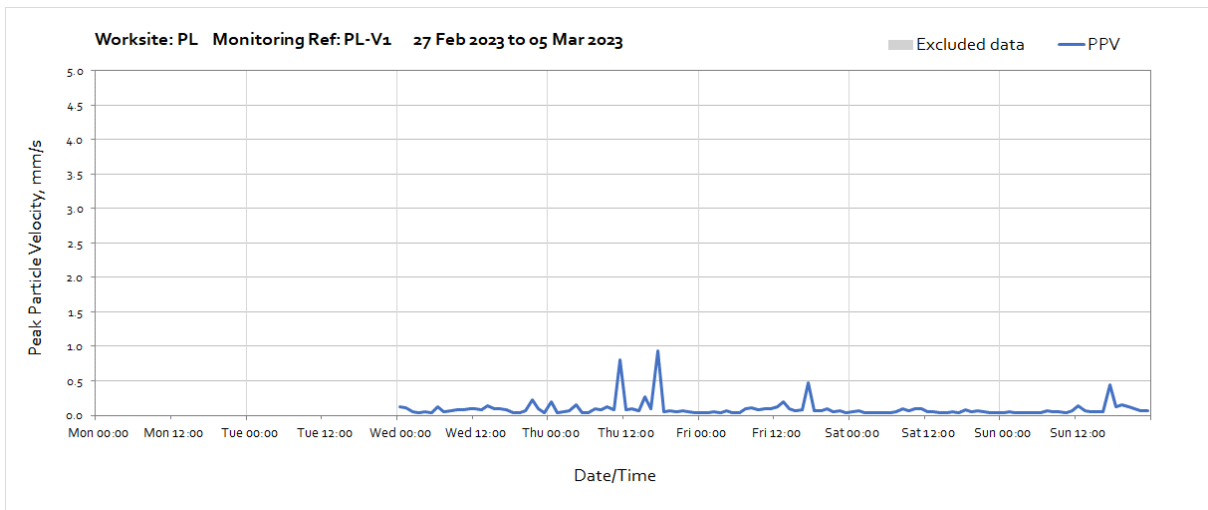
Note: High vibration levels measured at 15:00 on Thursday 16th March was due to topsoil stripping and pond perimeter works in the vicinity of the monitor.

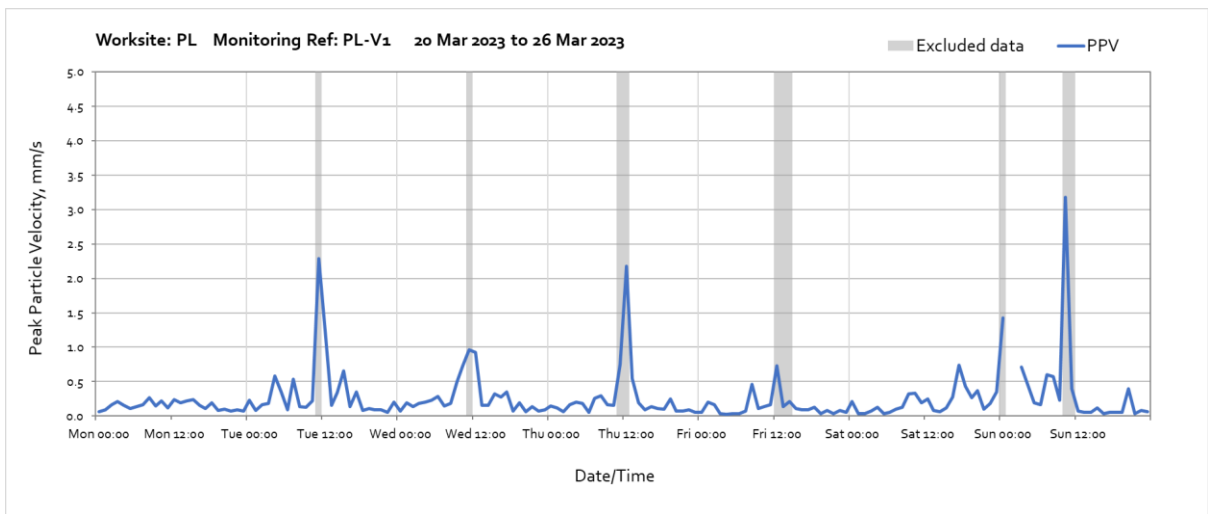
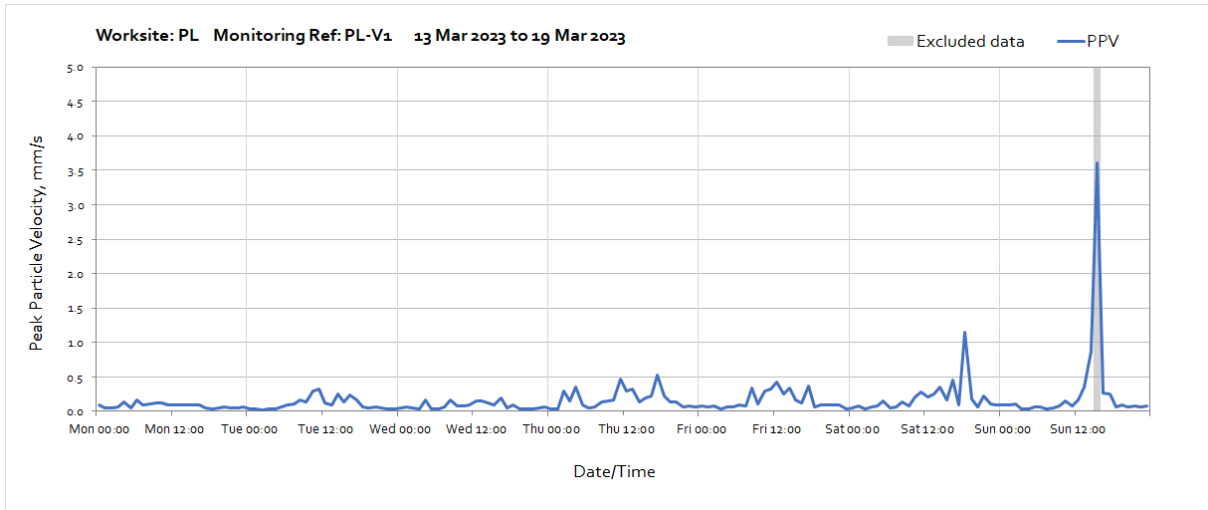


Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.

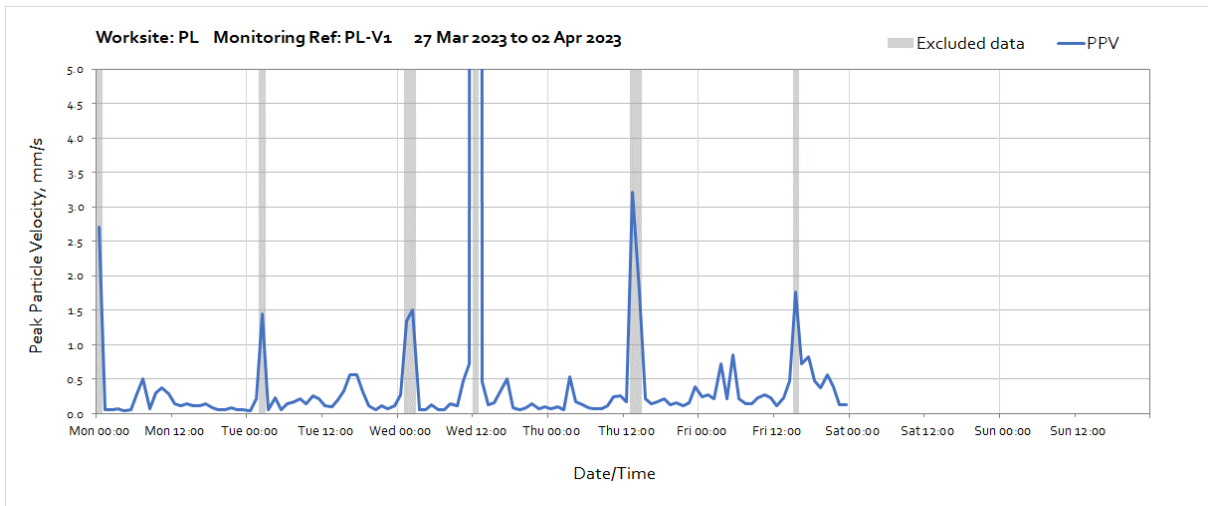


Worksite: PL – Monitoring Ref: PL-V1

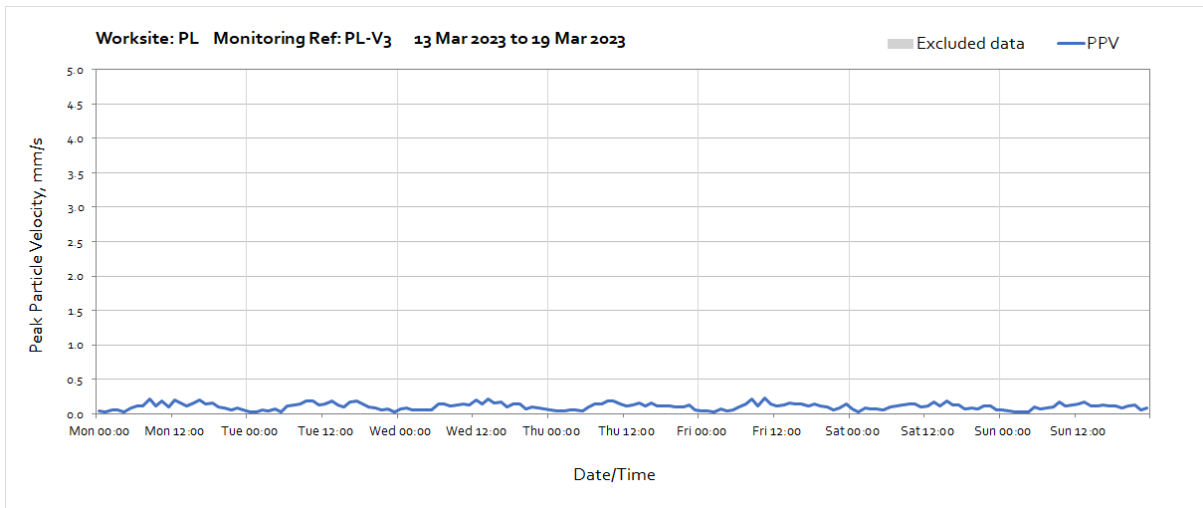
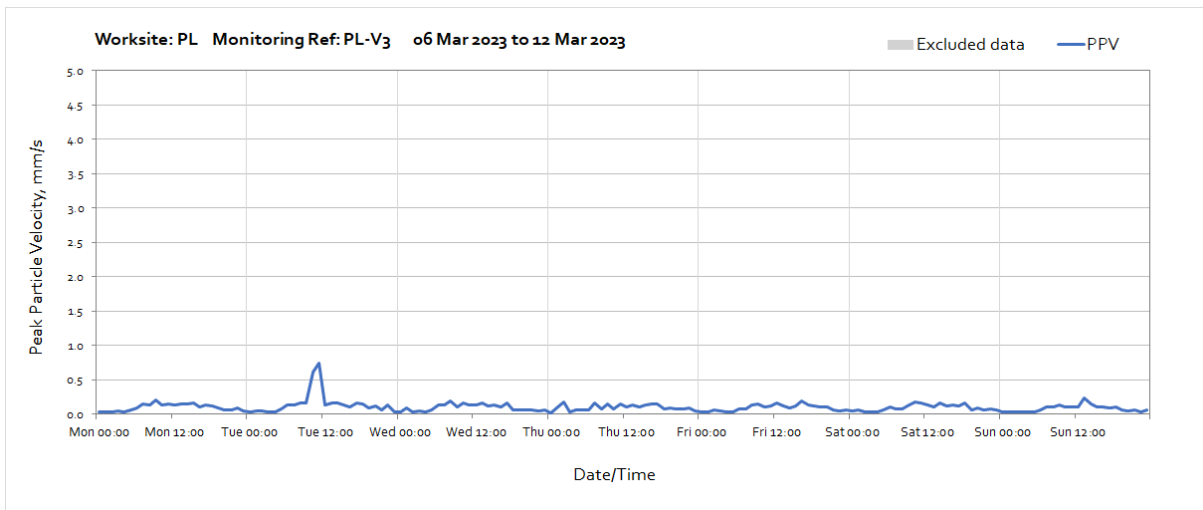
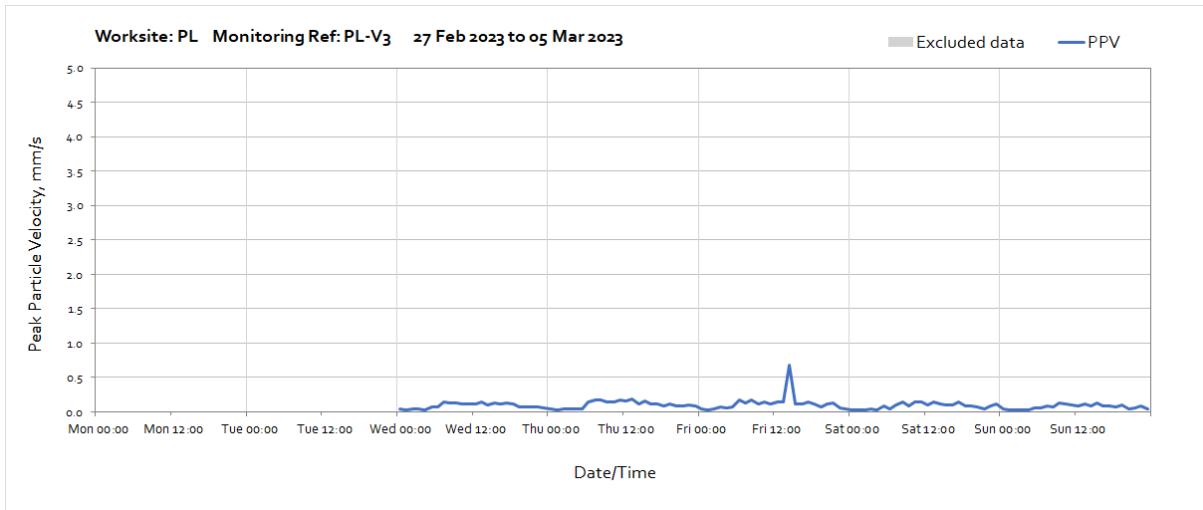


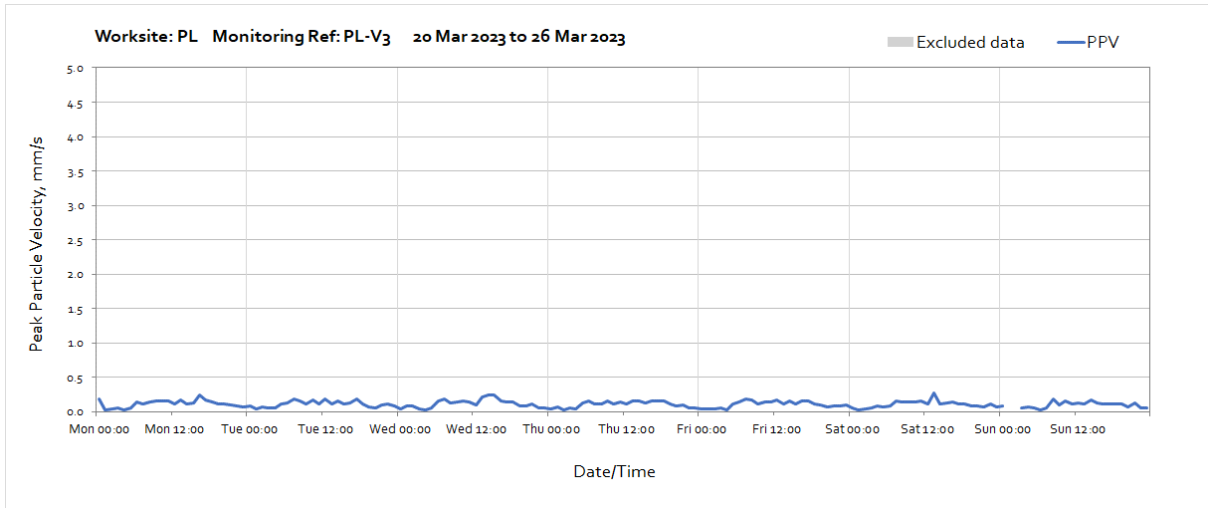


Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.

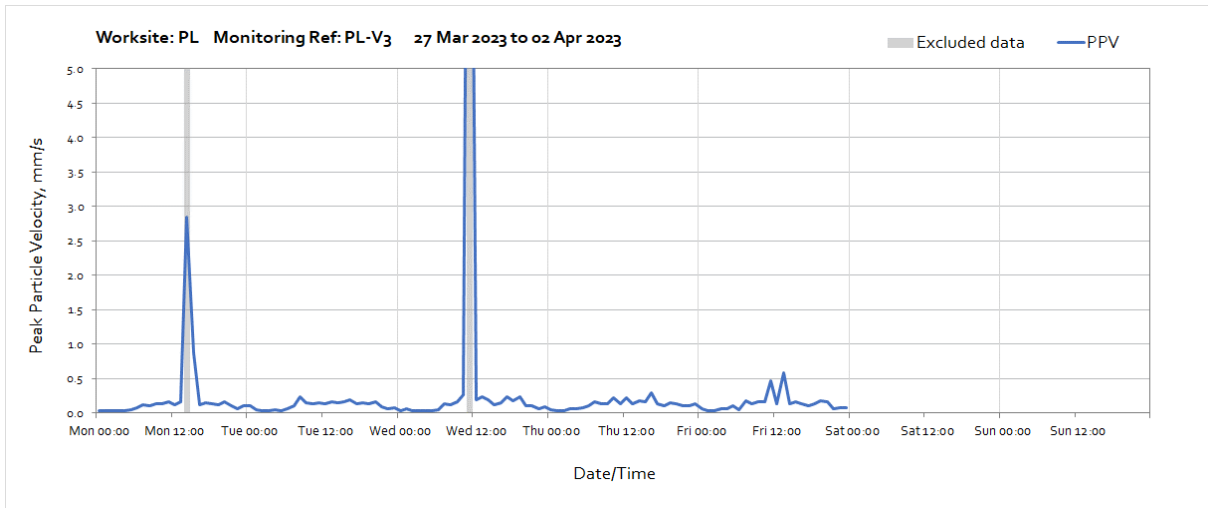


Worksite: PL - Monitoring Ref: PL-V3

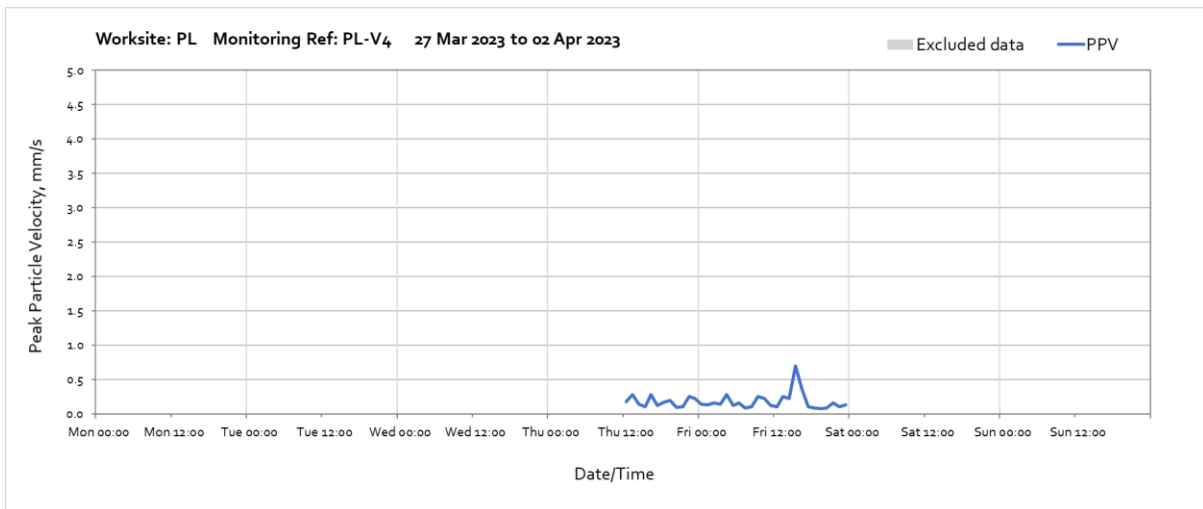




Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.

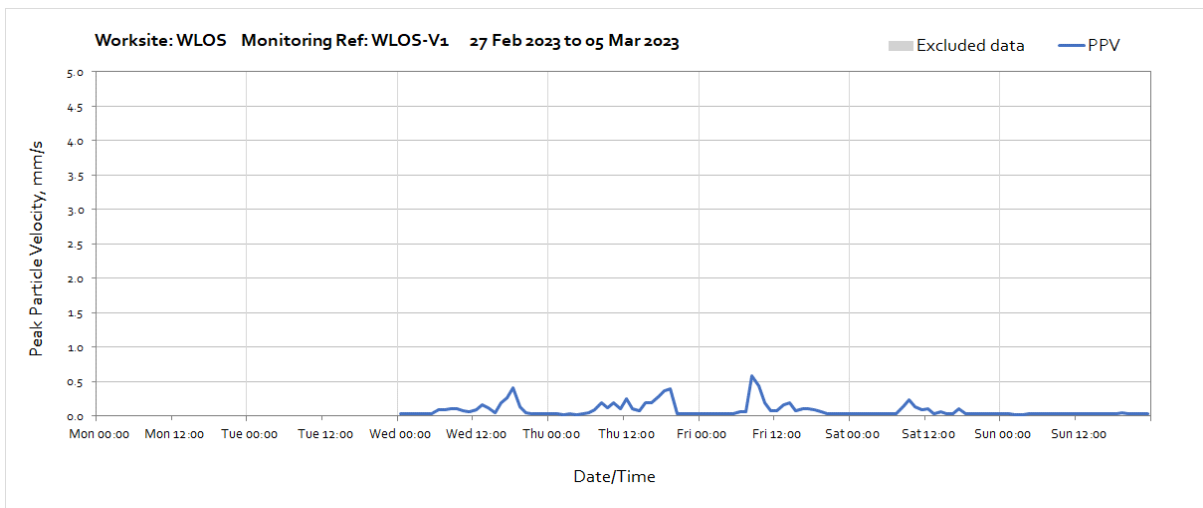


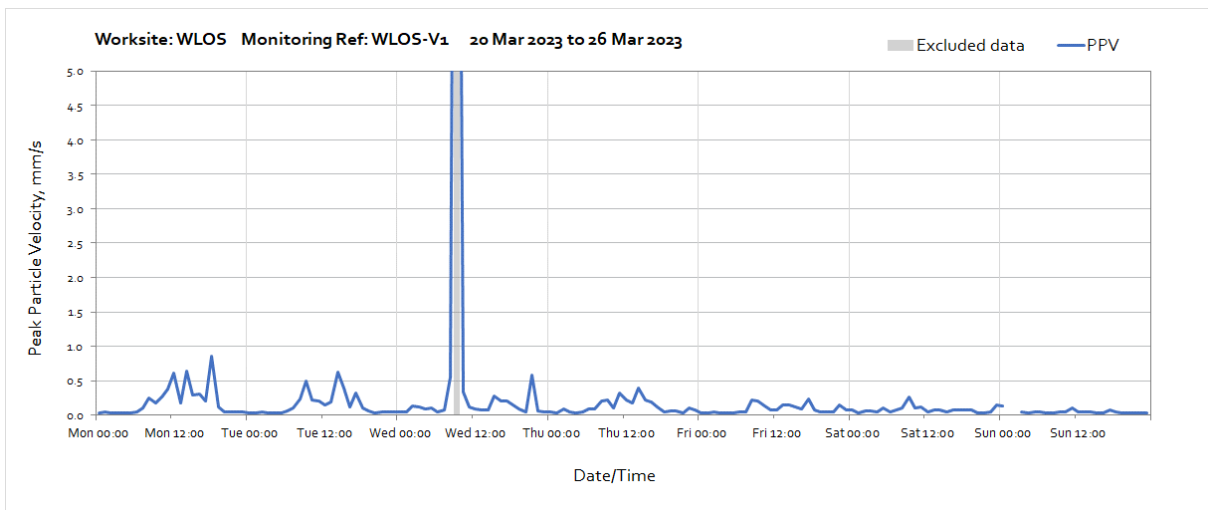
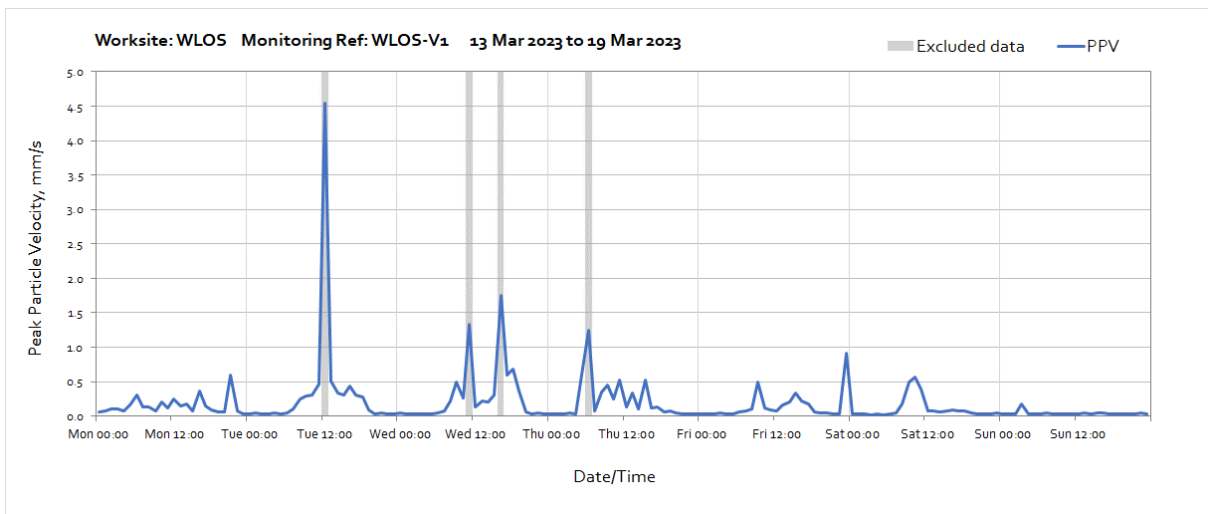
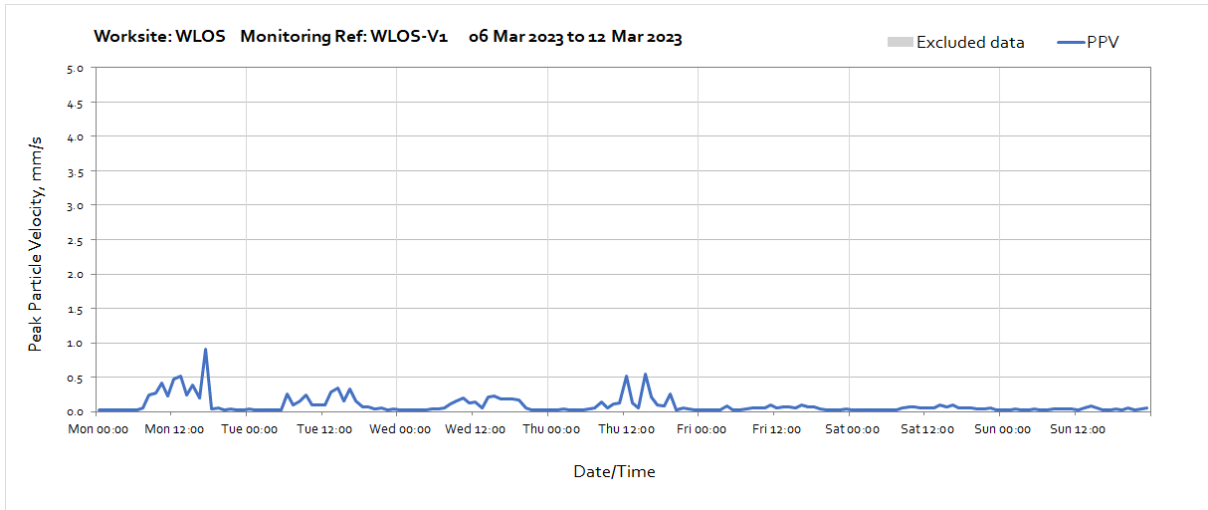
Worksite: PL – Monitoring Ref: PL-V4



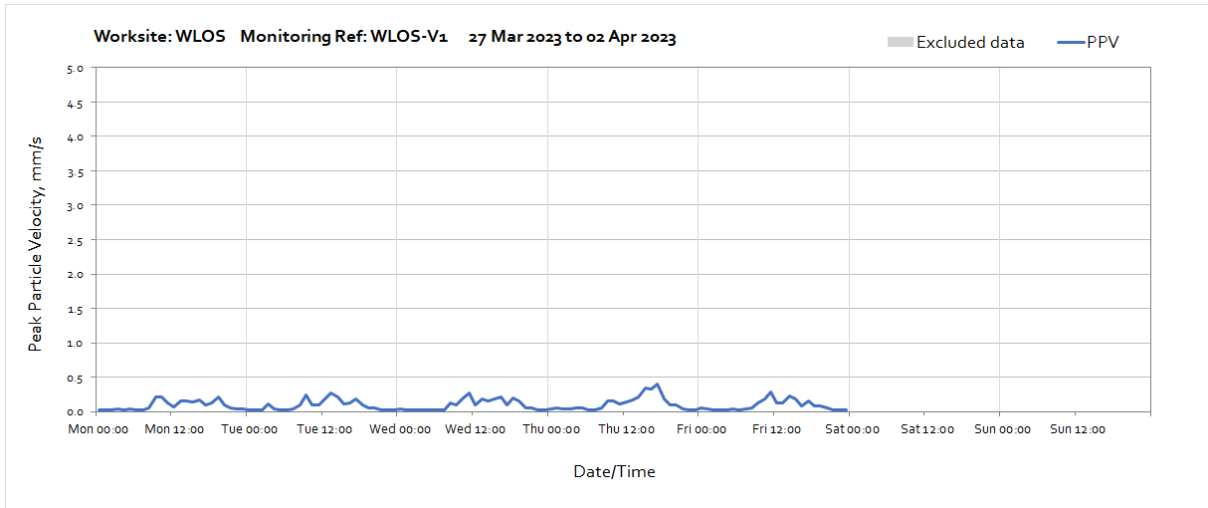
Note: Vibration monitor installed at 12:00 on Thursday 30th March.

Worksite: WLOS – Monitoring Ref: WLOS-V1

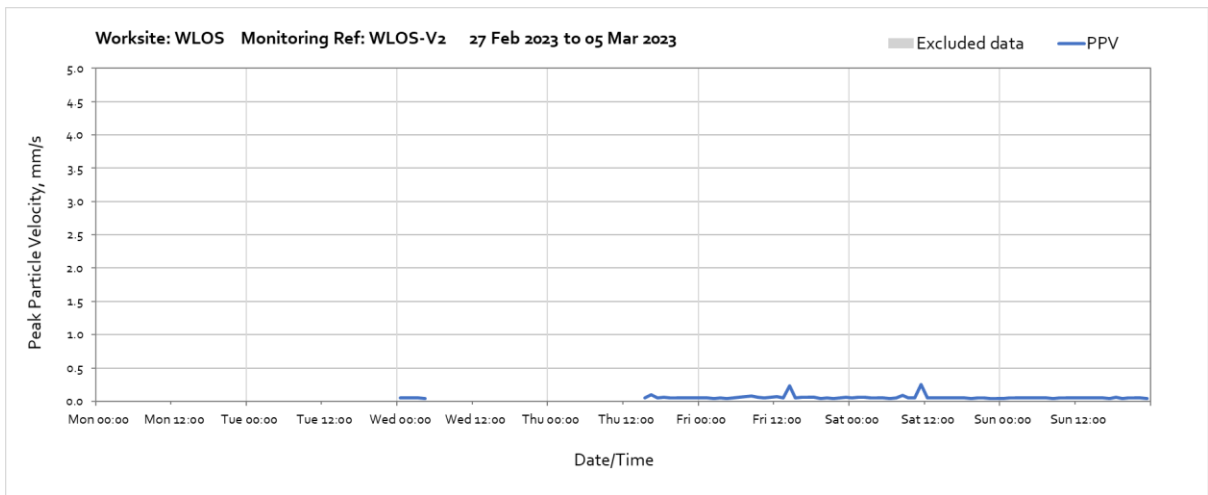




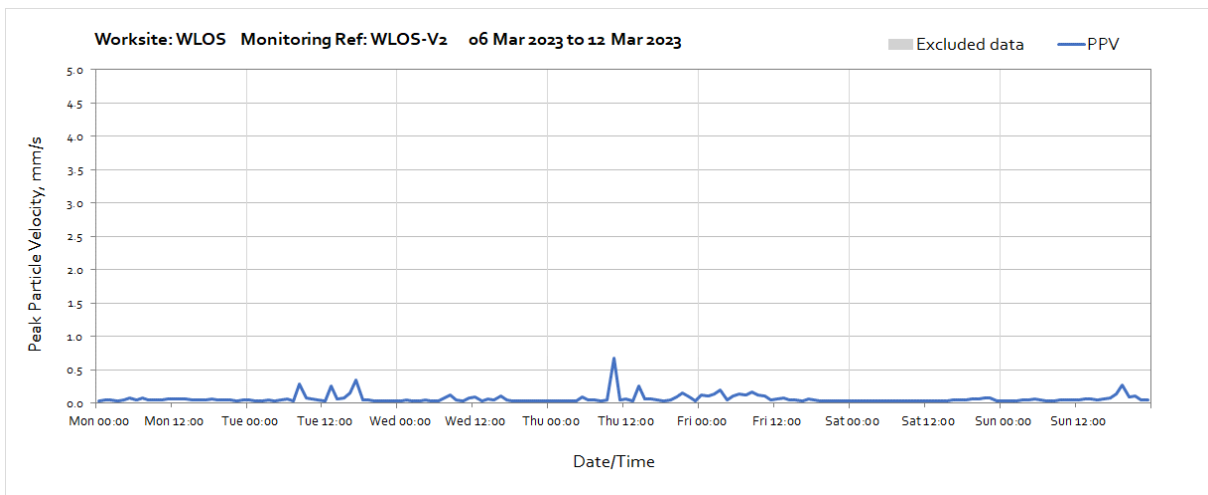
Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.

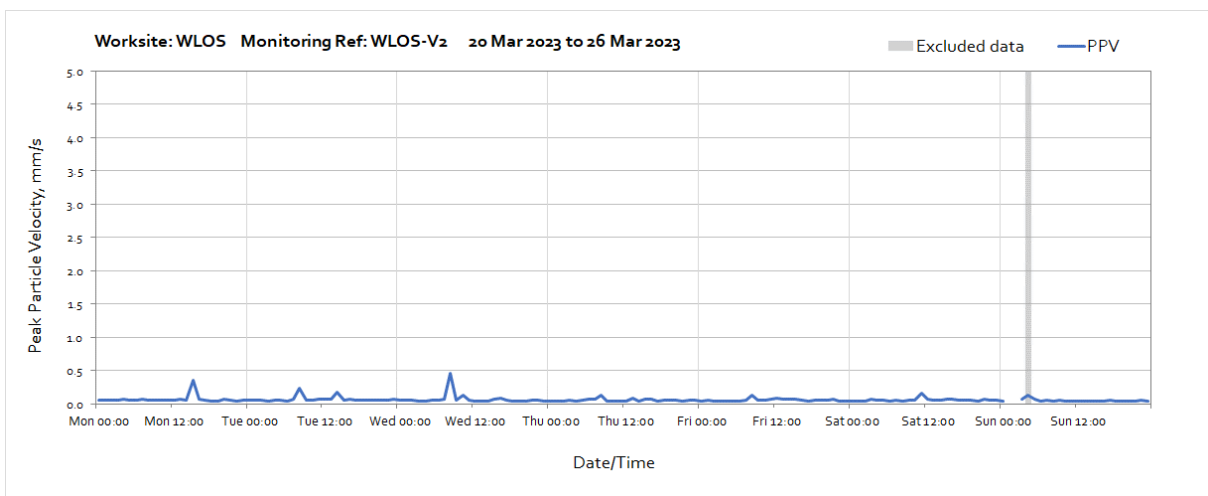
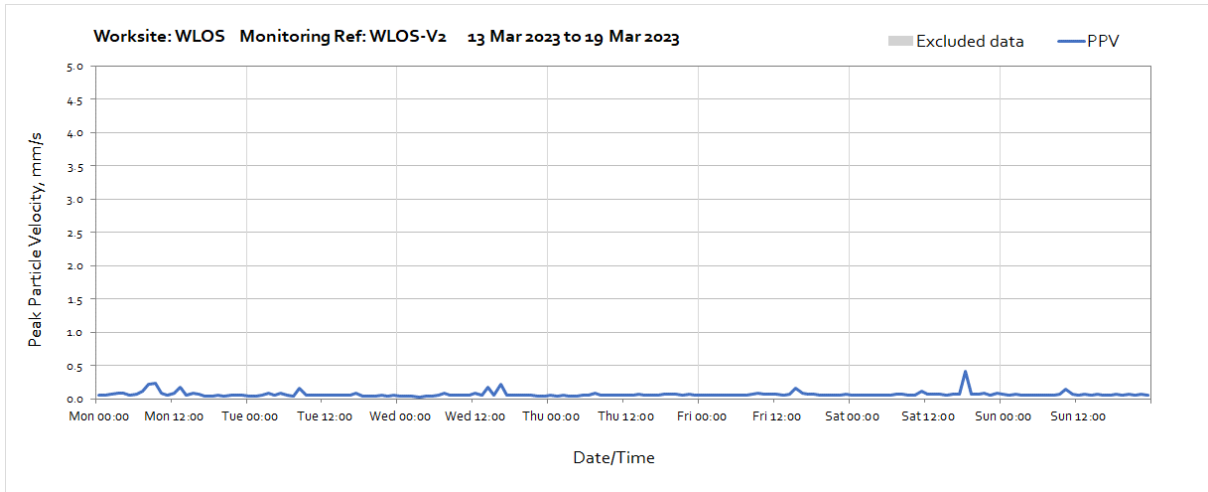


Worksite: WLOS - Monitoring Ref: WLOS-V2



Note: Missing data between 05:00 on Wednesday 1st March and 14:00 on Thursday 2nd March was due to loss of power to the monitor.





Note: Missing data between 01:00 and 03:00 on Sunday 26th March was due to a monitor time adjustment at the start of British Summer Time.

