

Construction Noise and Vibration Monthly Report – April 2022

North Warwickshire Borough Council

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|--|-----------|
| Non-Technical Summary | 1 |
| Abbreviations and Descriptions | 3 |
| 1 Introduction | 4 |
| 1.2 Measurement Locations | 6 |
| 2 Summary of Results | 7 |
| 2.1 Summary of Measured Noise and Vibration Levels | 7 |
| 2.2 Exceedances of the LOAEL and SOAEL | 9 |
| 2.3 Exceedances of Trigger Level | 11 |
| 2.4 Complaints | 11 |
| Appendix A Site Locations | 12 |
| Appendix B Monitoring Locations | 18 |
| Appendix C Data | 25 |

List of tables

| | |
|--|----|
| Table 1: Table of Abbreviations | 3 |
| Table 2: Monitoring Locations | 6 |
| Table 3: Summary of Measured dB L _{Aeq} Data over the Monitoring Period | 8 |
| Table 4: Summary of Measured PPV Data over the Monitoring Period | 9 |
| Table 5: Summary of Exceedances of LOAEL and SOAEL | 10 |
| Table 6: Summary of Exceedances of Trigger Levels | 11 |
| Table 7: Summary of Complaints | 11 |

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 April 2022.

Within this period monitoring was undertaken at the following worksites:

- Noise and vibration monitoring were undertaken at the Marston Box/Marston Lane worksite (ref.: MB), where work activities included road sweeper, general site and office maintenance, and concrete pouring, crane installations, hoardings, removing piling platforms, digging works, water connections works.
- Noise monitoring was undertaken at the Kingsbury Main Compound worksite (ref.: KMC), where work activities included moving stockpiles, fencing installation, road surfacing works, service installation, road sweeper, earthworks, installation of fuel pipes, stone delivery, and concrete works.
- Noise monitoring was undertaken at the Faraday Avenue Embankment and Underbridge worksite (ref.: FAEU), where work activities included site and office maintenance, site security, road sweeper, installation of piling platform, top soil stripping.
- Noise monitoring was undertaken at the Birmingham & Fazeley Canal Viaduct worksite (ref.: BFCV), where work was not carried out at this location during the reporting period.
- Noise monitoring was undertaken at the Water Orton South Compound worksite (ref.: WOSC), where work activities included excavations, installation of site signage, erecting fencing and construction of canopy structure.
- Noise monitoring was undertaken at the Attleboro Lane Overbridge worksite (ref.: ALO), where work activities included completion of compound works and the site haul road installation.
- Noise monitoring was not undertaken at the Birmingham Road site worksite (ref:BRD), as this had not yet commenced.

Further works were also undertaken at Gilson as part of sewer utility works.

There were no exceedances of the HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>) during the reporting period.

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

No complaints were received within the North Warwickshire area 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 North Warwickshire Borough Council (NWBC) area for the period 1st to 30th April 2022.

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

- Marston Box/Marston Lane worksite, ref.: MB (see Plan 1 in Appendix A), where work activities included:
 - Site and office maintenance,
 - Site security ;
 - Concrete pouring;
 - Road sweeping and;
 - Drilling.

1.1.4 Further works were also undertaken at Gilson as part of sewer utility works.

- Kingsbury Main Compound worksite, ref.: KMC (see Plan 1 in Appendix A), where work activities included:
 - Stockpiling moving works and clean up the area;
 - Fencing installation;

- Road surfacing works;
 - Road sweeping works;
 - Earthworks, including top soil strip and bulk excavation;
 - Fuel pipe installations, including excavation of trenches, installation of trench box and backfilling ;
 - Delivery of stone; and
 - Concrete works.
- Faraday Avenue Embankment and Underbridge worksite, ref.: FAEU (see Plan 2 in Appendix A), work activities included:
 - Site security and maintenance;
 - Top soil stripping;
 - Installation of piling platforms;
 - Moving material; and
 - Deliveries.
 - Birmingham & Fazeley Canal Viaduct worksite, ref.: BFCV (see Plan 1 in Appendix A), where no works were undertaken during the reporting period:
 - Water Orton South Compound worksite, ref.: WOSC (see Plan 3 in Appendix A), work activities included:
 - Installation of fencing;
 - Excavations and installation of site signage; and
 - Construction of canopy structures.
 - Attleboro Lane Overbridge worksite, ref.: ALO (see Plan 3 in Appendix A), work activities included:
 - completion of compound works and haul road installation.
 - Birmingham Road worksite, ref.: BRD (see Plan 4 in Appendix A), were no works were undertaken during the reporting period.

1.1.5 Further works were also undertaken at Gilson as part of sewer utility works.

1.1.6 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 Seven (7) noise monitoring installations and four (4) vibration monitoring installations were active in April in the NWBC area. Table 2 summarises the position of noise and vibration monitoring installations within the NWBC area in April 2022.
- 1.2.2 Maps showing the position of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

| Worksite Reference | Measurement Reference | Address |
|--|-----------------------|---|
| Marston Box (MB) | MB-N1 | Kingsbury Road, Curdworth, Sutton Coldfield, West Midland |
| | MB-V1 | Kingsbury Road, Curdworth, Sutton Coldfield, West Midland |
| Kingsbury Main Compound (KMC) | KMC-N1 | Kingsbury Road, Curdworth CP, Marston, Warwick, West Midland |
| Faraday Avenue Embankment and Underbridge (FAEU) | FAEU-N1 | Orchard Cottage, Newlands Lane, Curdworth, Warwickshire |
| 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, |
| Water Orton South Compound (WOSC) | WOSC-N1 | 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 |
| Birmingham Road (BRD) | BRD-N2 | New Cottages, Birmingham Road, Coleshill, Birmingham |
| | BRD-V1 | New Cottages, Birmingham Road, Coleshill, Birmingham |

2 Summary of Results

2.1 Summary of Measured Noise and Vibration Levels

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

Table 3: Summary of Measured dB LAeq Data over the Monitoring Period

| Worksite Reference | Measurement Reference | Site Address | Free-Field or Façade Measurement | Weekday Average LAeq,T (Highest Day LAeq,T) | | | | | Saturday Average LAeq,T (Highest Day LAeq,T) | | | | | Sunday / Public Holiday Average LAeq,T (Highest Day LAeq,T) | |
|--------------------|-----------------------|--|----------------------------------|---|----------------|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|---|----------------|
| | | | | 0700 - 0800 | 0800 - 1800 | 1800 - 1900 | 1900 - 2200 | 2200 - 0700 | 0700 - 0800 | 0800 - 1300 | 1300 - 1400 | 1400 - 2200 | 2200 - 0700 | 0700 - 2200 | 2200 - 0700 |
| MB | MB-N1 | Kingsbury Road, Curdworth | Free field | 57.7 (61.3) | 57.8 (65.8) | 58.9 (62.0) | 57.3 (64.7) | 54.5 (60.8) | 56.7 (58.0) | 56.7 (59.0) | 54.8 (59.1) | 55.8 (60.9) | 52.2 (56.7) | 55.5 (59.3) | 52.5 (59.3) |
| KMC | KMC-N1 | Kingsbury Road, Curdworth CP | Free field | 57.3 (61.7) | 58.1 (62.5) | 54.0 (62.6) | 54.0 (60.8) | 54.2 (61.7) | 56.8 (58.7) | 56.7 (63.1) | 54.3 (59.5) | 54.4 (59.4) | 52.6 (56.4) | 54.1 (58.6) | 53.5 (60.3) |
| FAEU | FAEU-N1 | Orchard Cottag, Newlands Lane, Curdworth | Free field | 57.9 (62.0) | 61.3 (66.1) | 54.3 (60.6) | 53.7 (60.6) | 54.5 (62.1) | 56.6 (59.0) | 54.3 (58.6) | 54.8 (58.8) | 54.1 (58.8) | 52.4 (57.6) | 54.5 (59.3) | 53.6 (62.0) |
| BFCV | BFCV-N1 | Lock Cottage, Marston Lane, Curdworth CP | Free field | 66.2 (67.8) | 66.0 (67.8) | 66.5 (69.5) | 64.8 (70.4) | 63.5 (69.7) | 63.0 (64.6) | 64.1 (67.3) | 64.0 (68.0) | 64.1 (69.9) | 61.6 (67.6) | 64.7 (71.1) | 63.4 (68.8) |
| WOSC | WOSC-N1 | 53 Watton Lane, Water Orton CP | Free field | 66.1 (68.1) | 66.2 (69.0) | 65.6 (68.5) | 63.6 (68.1) | 60.7 (66.6) | 62.8 (65.0) | 65.3 (67.8) | 65.8 (68.9) | 64.1 (68.2) | 58.5 (62.0) | 63.7 (67.8) | 59.9 (67.2) |
| ALO | ALO-N1 | 47 Attleboro Lane, Water Orton | Free field | 56.6 (61.0) | 58.9 (67.2) | 54.2 (60.8) | 52.9 (60.9) | 52.8 (62.7) | 54.9 (55.7) | 54.5 (57.8) | 52.3 (53.7) | 53.0 (57.3) | 51.5 (57.1) | 53.7 (56.8) | 53.0 (61.4) |
| BRD | BRD-N2 | New Cottages, Birmingham Road, Coleshill | Free-field | 60.7 (65.4) | 60.6 (66.1) | 58.1 (64.9) | 56.9 (63.5) | 56.1 (65.4) | 58.5 (62.1) | 58.6 (63.3) | 58.3 (62.7) | 58.2 (62.5) | 54.2 (60.8) | 58.0 (62.8) | 55.9 (64.9) |

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 | MB-V1 | Kingsbury Road, Curdworth, Sutton Coldfield | 1.22 (X-axis) |
| BFCV | BFCV-V1 | Lock Cottage, Marston Lane, Curdworth CP | 0.57 (Z-axis) |
| ALO | ALO-V1 | 47 Attleboro Lane, Water Orton | 1.52 (X-axis) |
| BRD | BRD-V1 | New Cottages, Birmingham Road, Coleshill | 1.67 (Y-axis) |

2.1.3 Appendix C presents graphs of the noise and vibration monitoring data over the month for each of the measurement locations. Noise data presented consists of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). Vibration data presented consist of hourly PPV values. The full data set for the monitoring equipment can be found at the following location: <https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

2.2 Exceedances of the 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 |
|--------------------|-----------------------|--|--|--------------------------|--------------------------------|--------------------------------|
| MB | MB-N1* | Kingsbury Road, Curdworth | All days | All periods | No exceedance | No exceedance |
| KMC | KMC-N1* | Wheatley House, Kingsbury Road, Sutton Coldfield | All days | All periods | No exceedance | No exceedance |
| FAEU | FAEU-N1 | Orchard Cottage, Newlands Lane, Curdworth | Weekdays | 08:00-13:00 | 3 | No exceedance |
| BFCV | BFCV-N1 | Lock Cottage, Marston Lane, Curdworth | Saturdays | 08:00-13:00 | No exceedance | No exceedance |
| WOSC | WOSC-N1 | 53 Watton Lane, Water Orton CP, Warwickshire | Weekdays Saturdays | 0800-1800 08:00-13:00 | 20 5 | No exceedance No exceedance |
| ALO | ALO-N1 | 47 Attleboro Lane, Water Orton, Birmingham | Weekdays | 0800-1800 | 4 | 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 |
|--------------------|-----------------------|--|--|-------------|--------------------------------|--------------------------------|
| BRD | BRD-N2 | New Cottages, Birmingham Road, Coleshill | Weekdays | All Periods | No exceedance | No exceedance |

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

2.2.6 Thirty Three (33) exceedances of the LOAEL were recorded at noise monitoring locations during core working hours. No exceedances of SOAEL were recorded due to HS2 construction works during April 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 |
|--|--------------------|----------------------|-------------------|---|---------------|
| - | - | - | - | - | - |

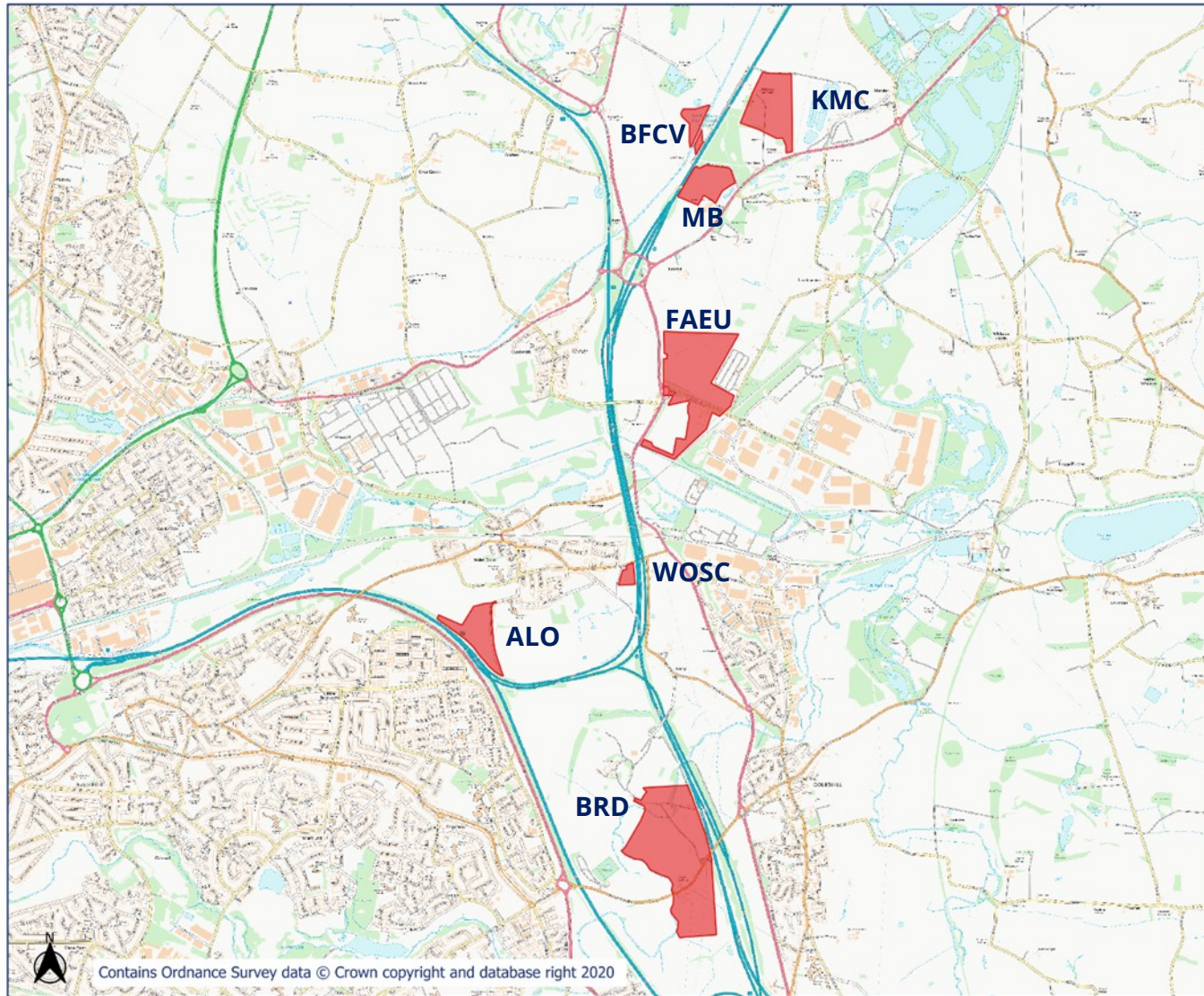
2.4 Complaints

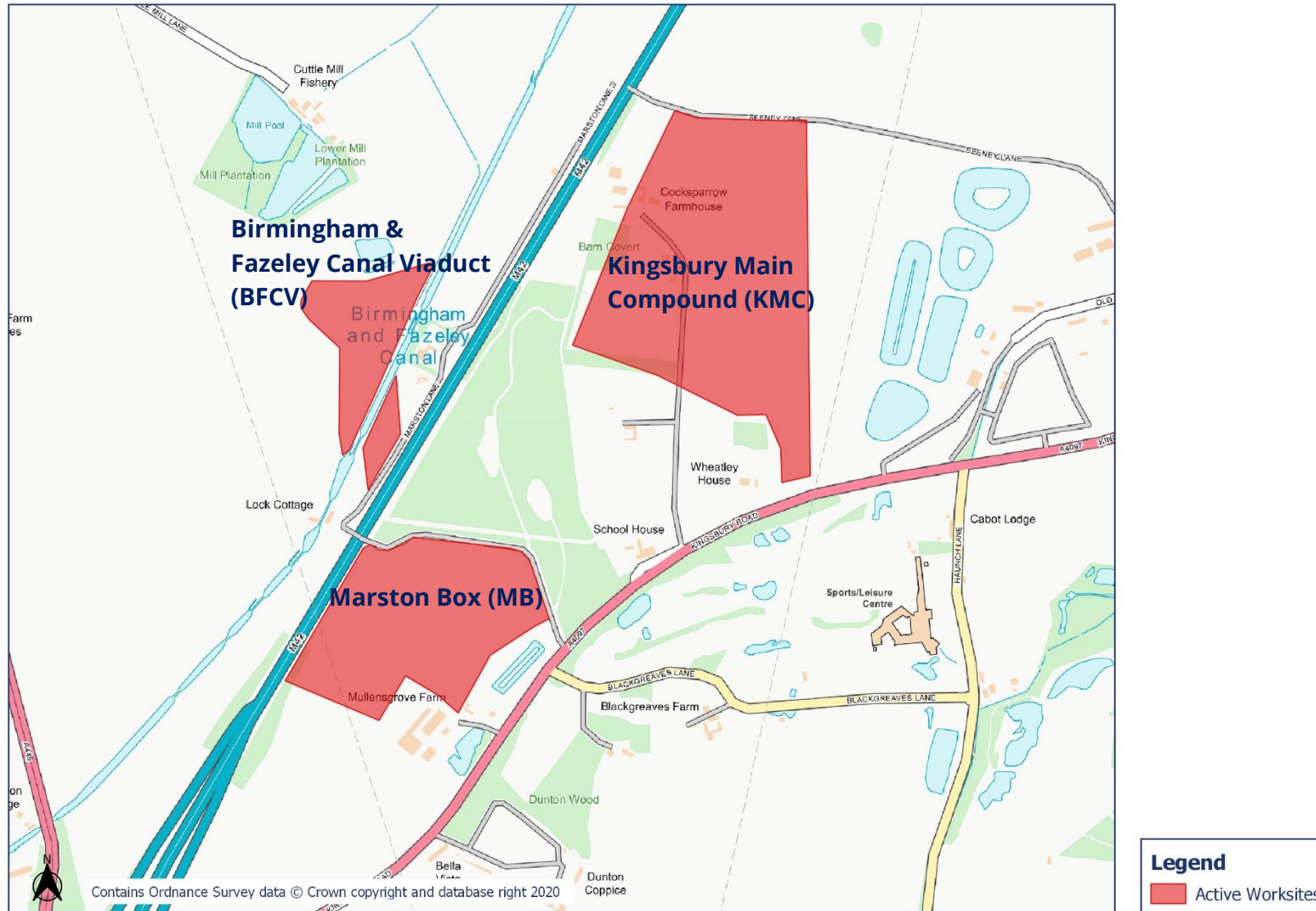
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

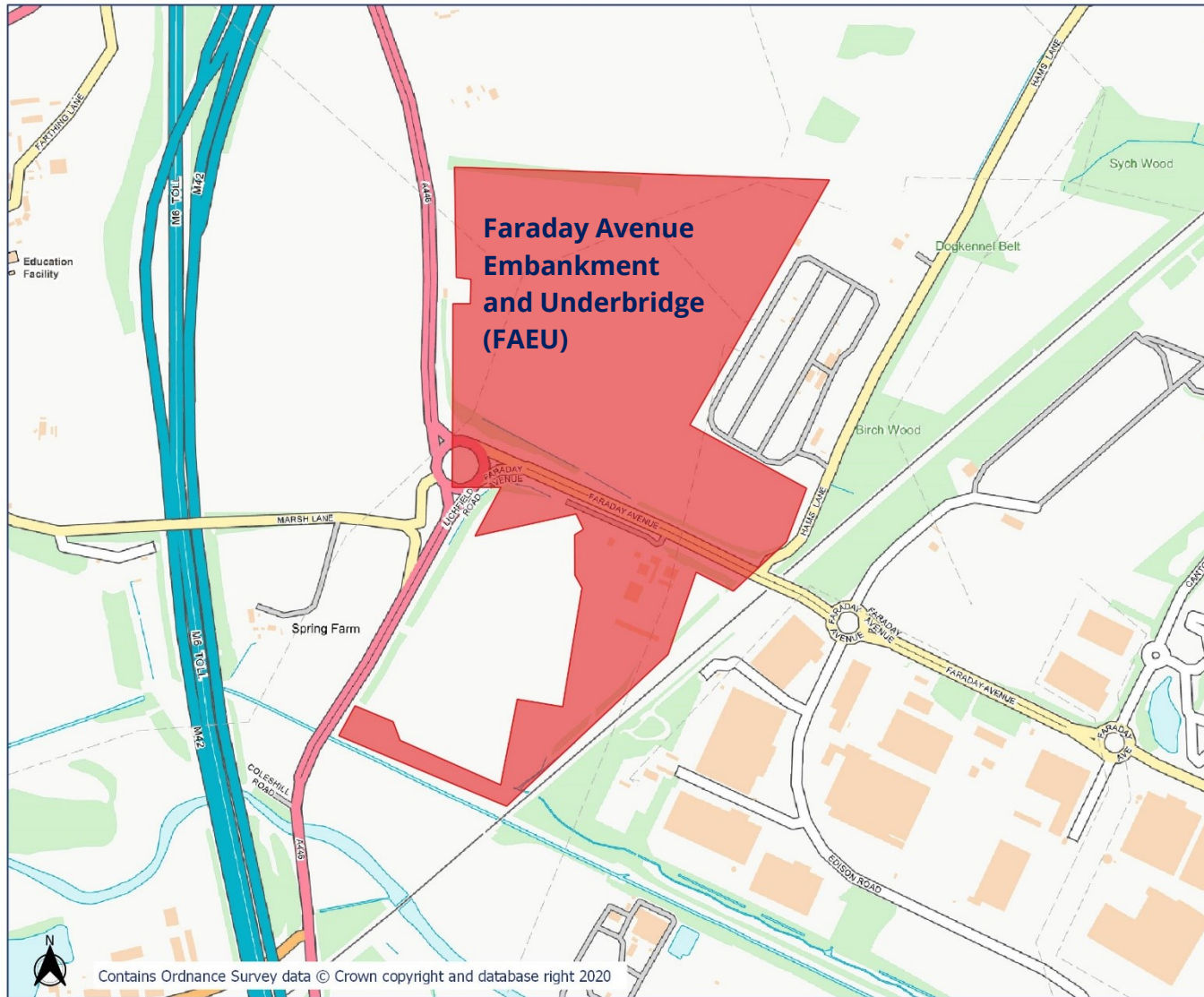
Table 7: Summary of Complaints

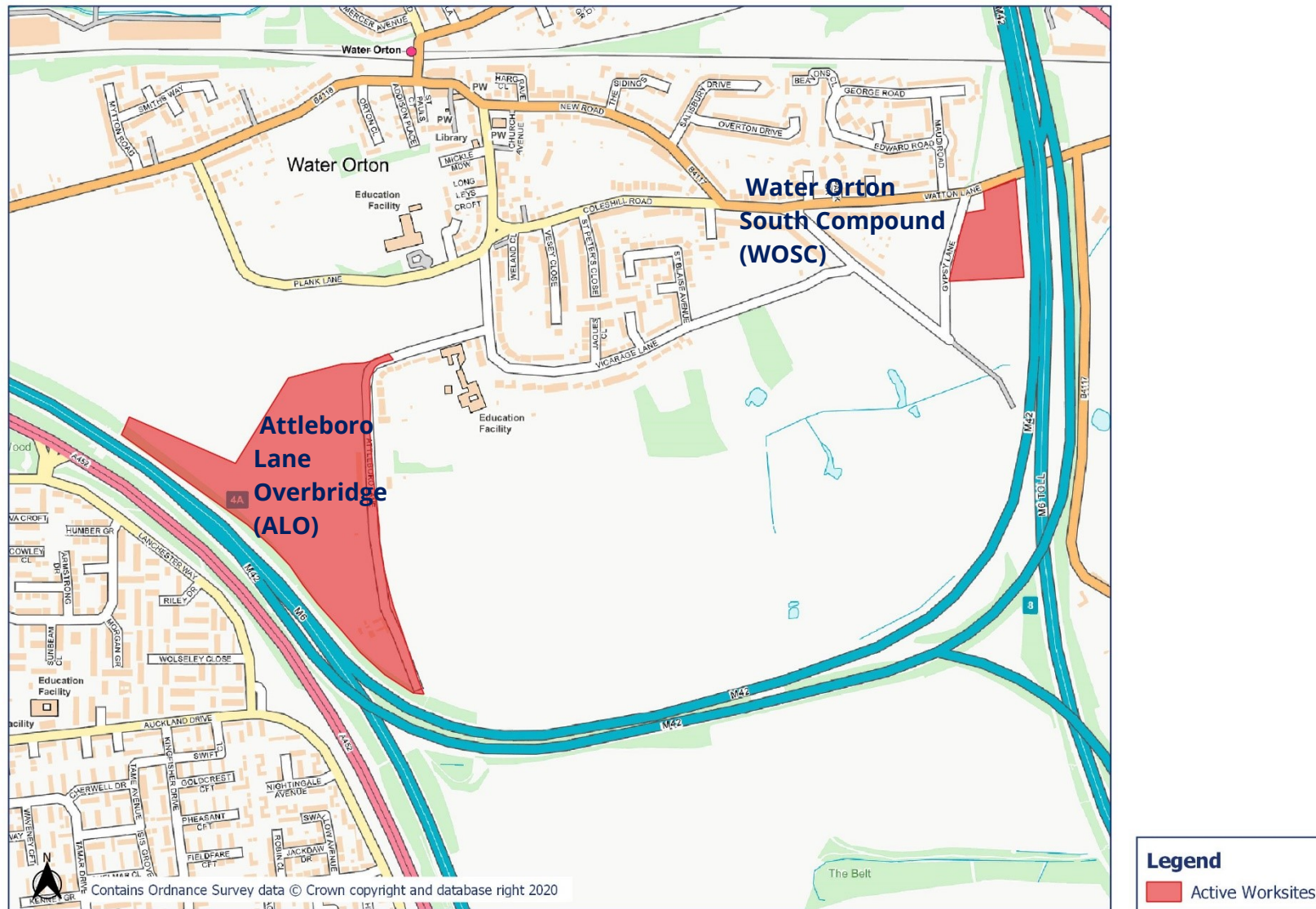
| Complaint Reference Number | Worksite Reference | Description of Complaint | Results of Investigation | Actions Taken |
|----------------------------|--------------------|--------------------------|--------------------------|---------------|
| - | - | - | - | - |

Appendix A Site Locations

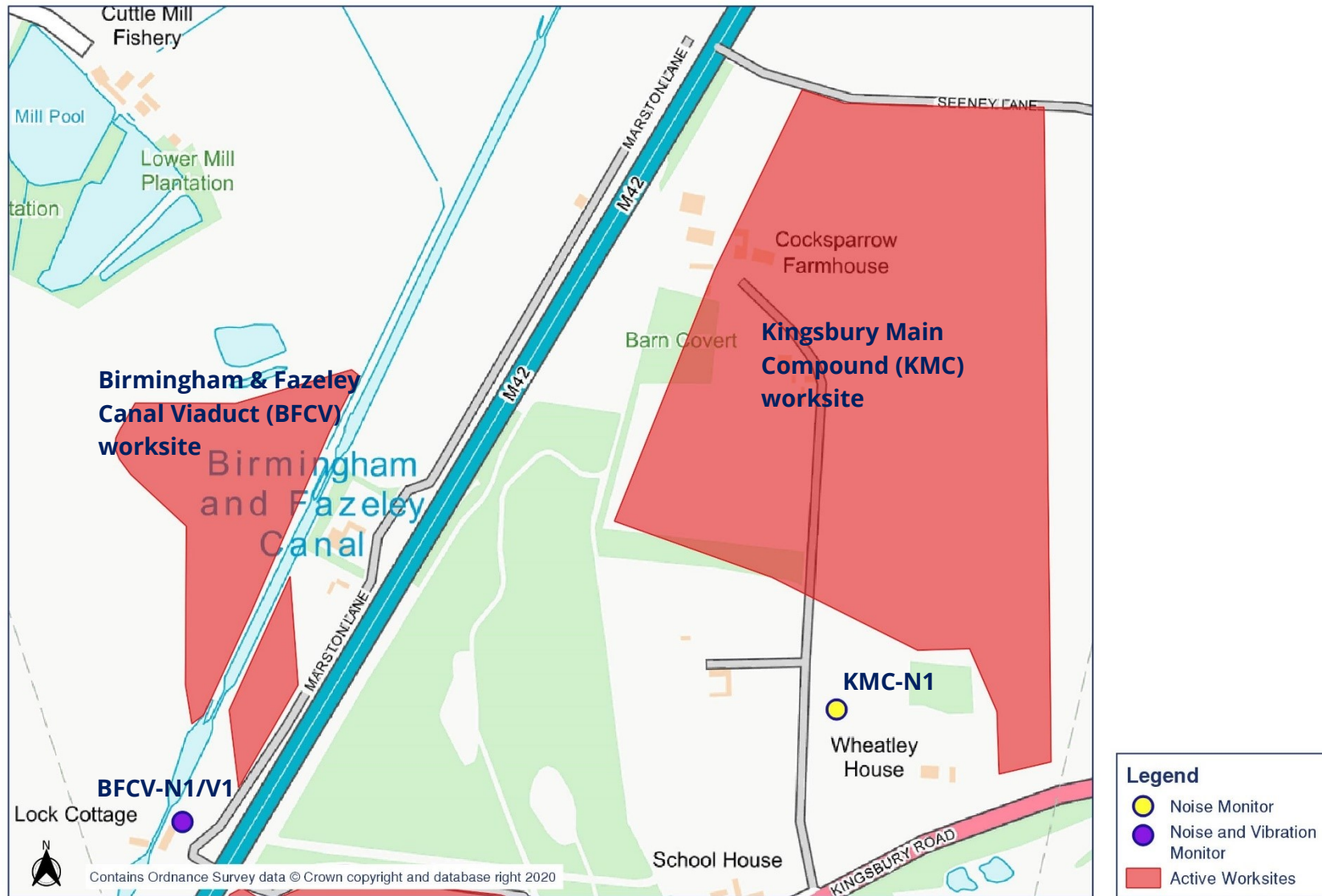


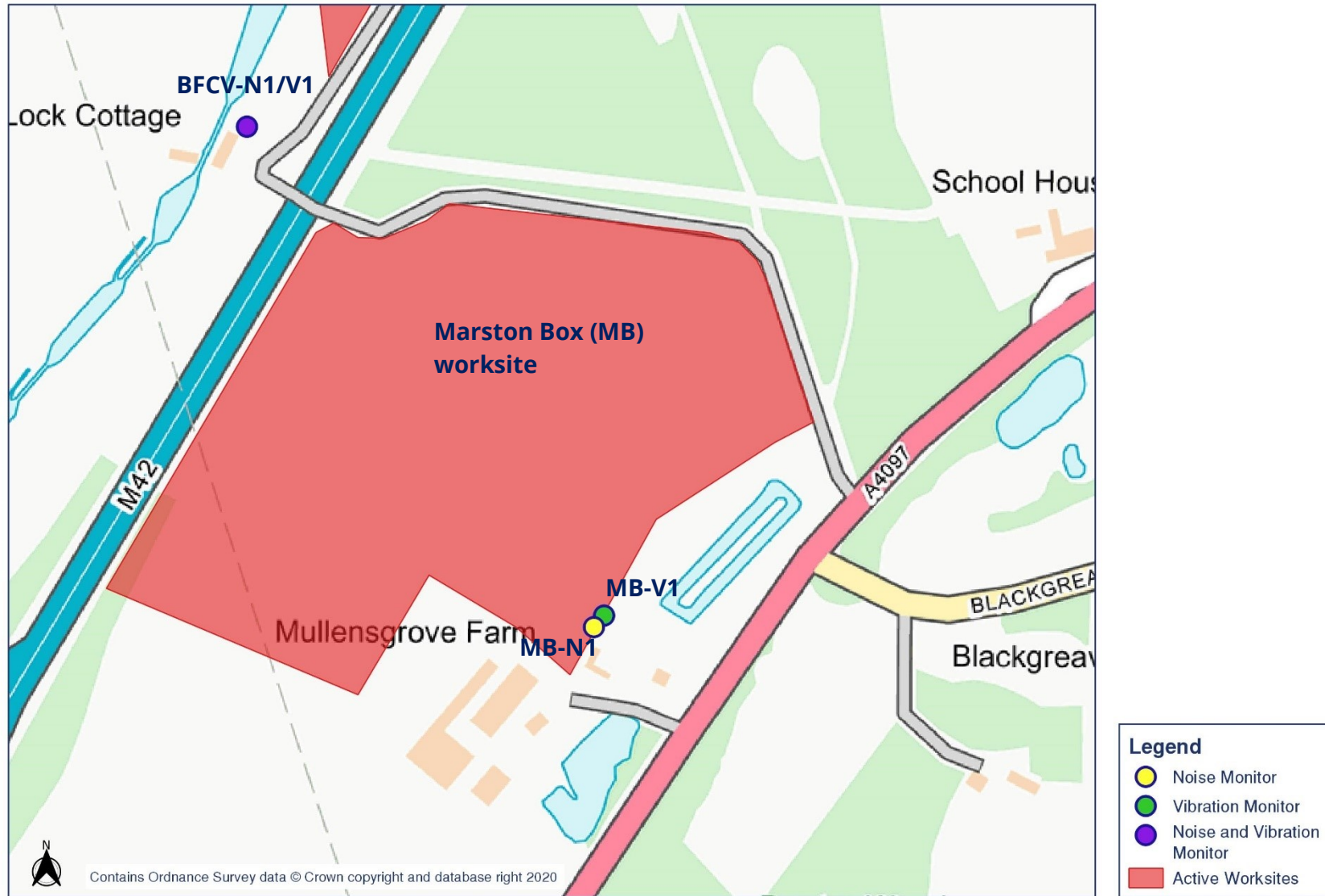


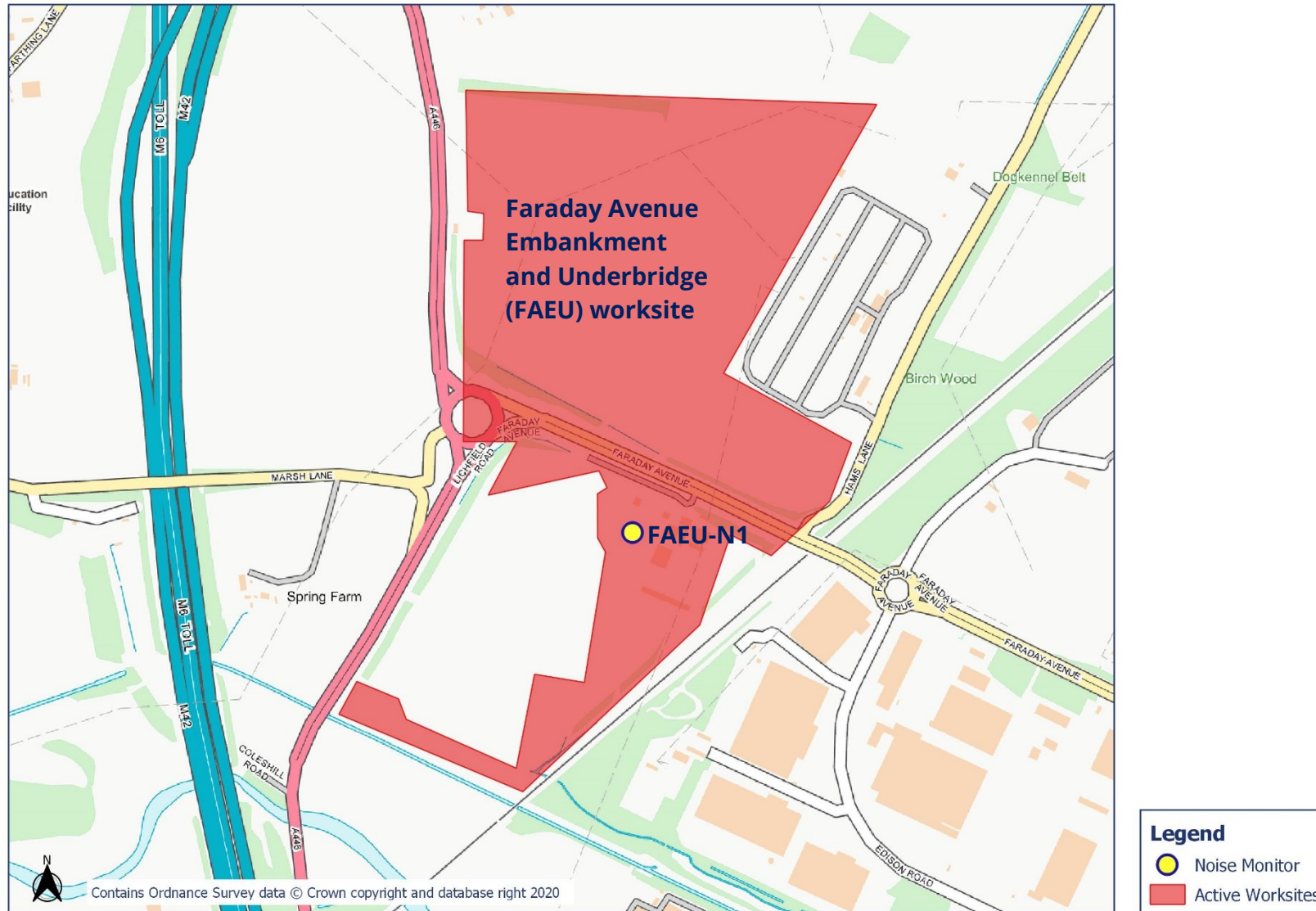


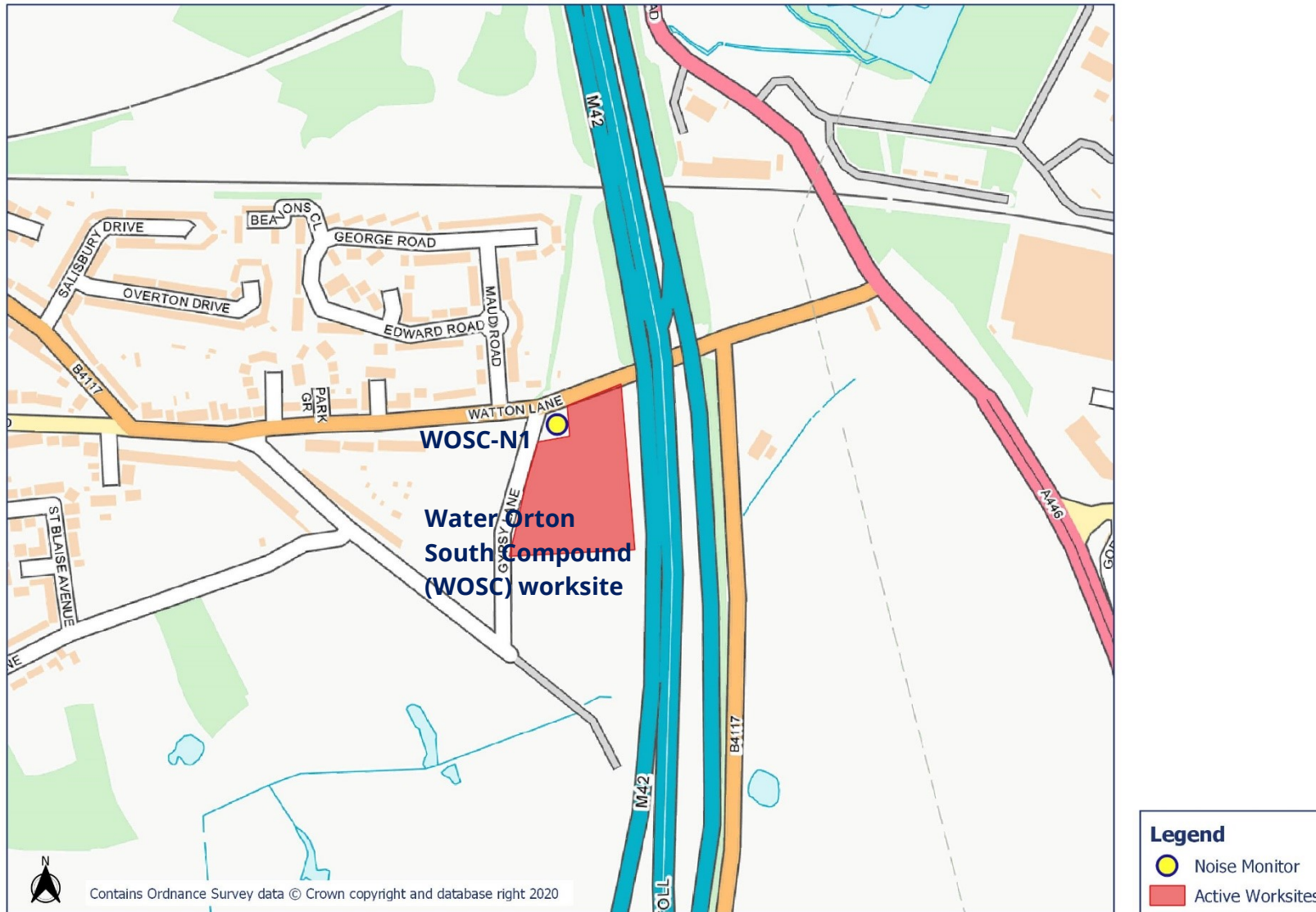


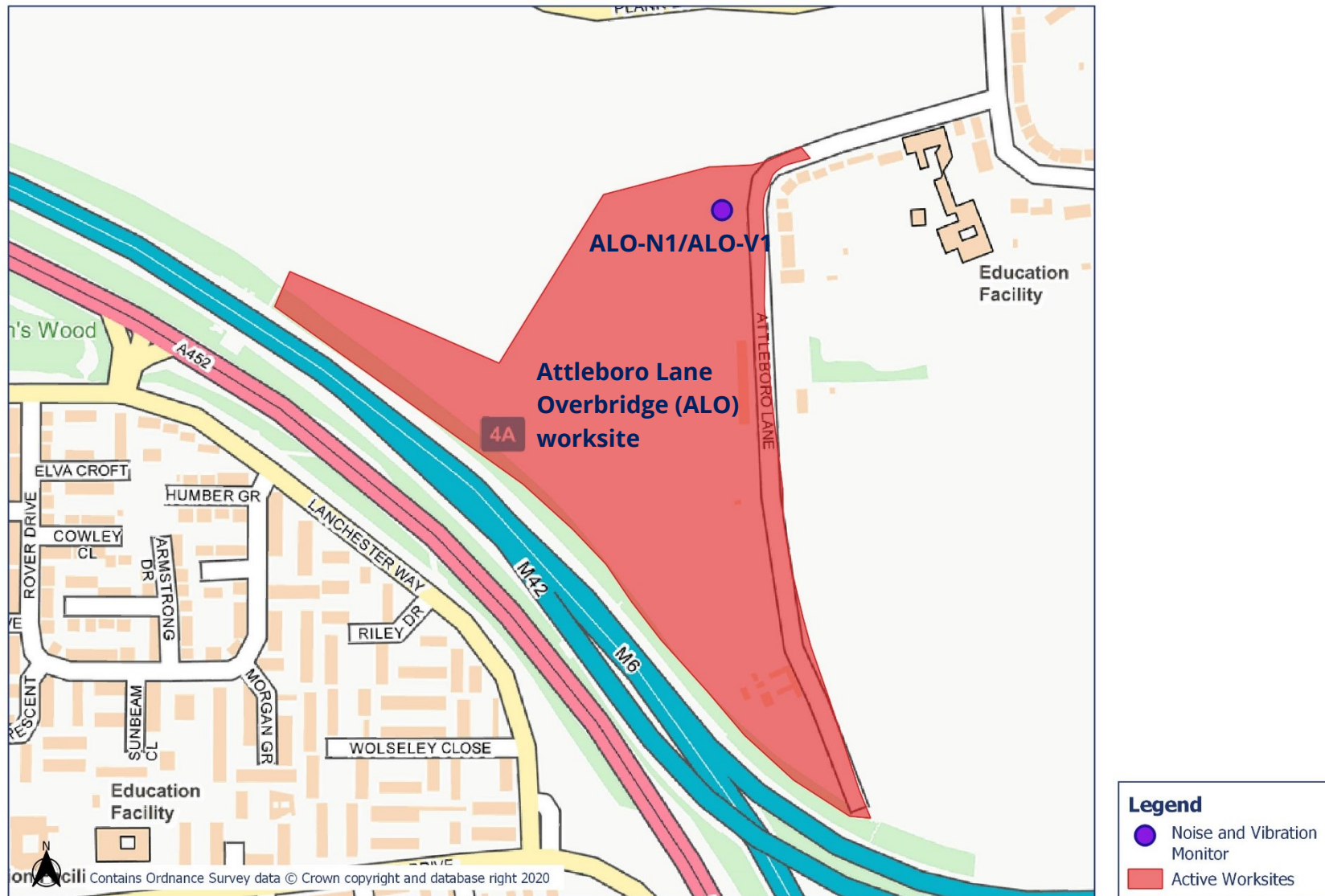
Appendix B Monitoring Locations

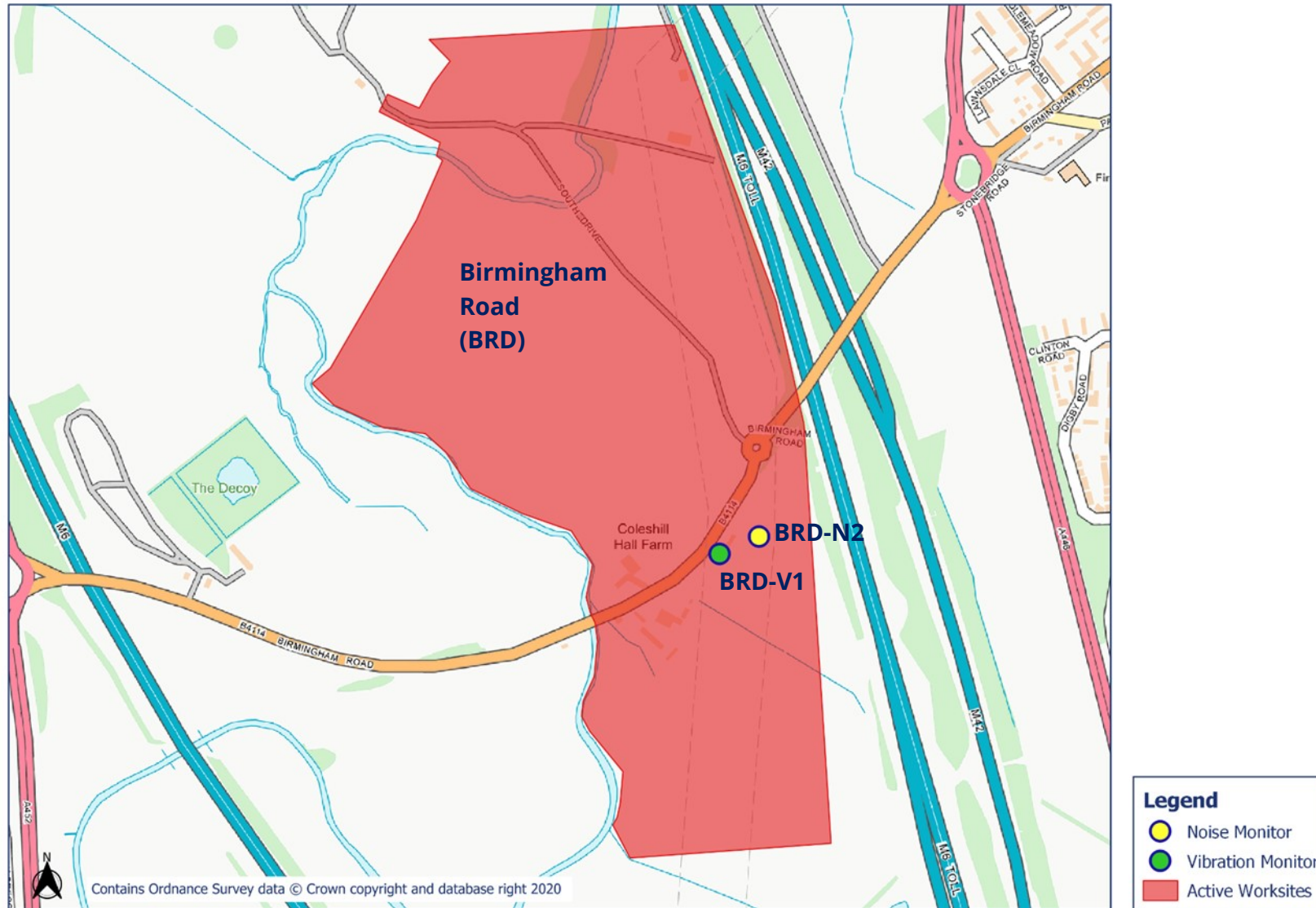










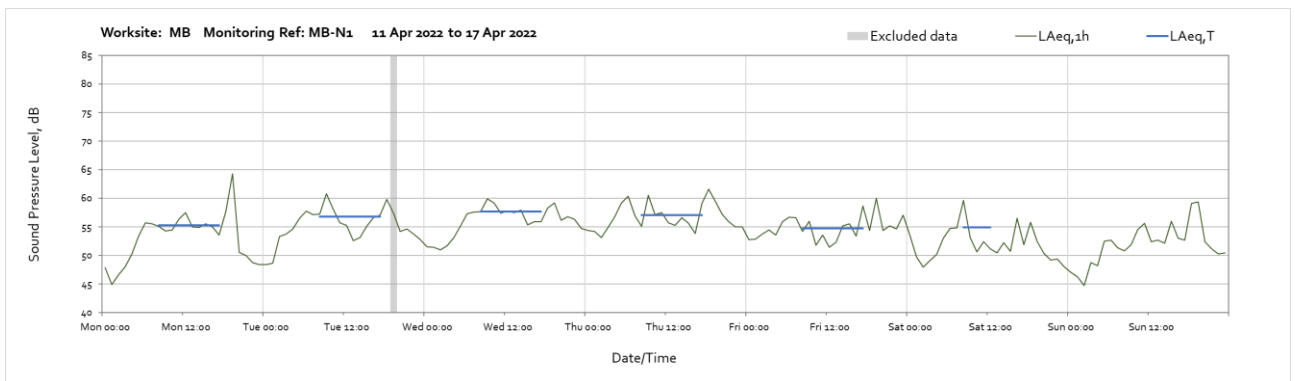
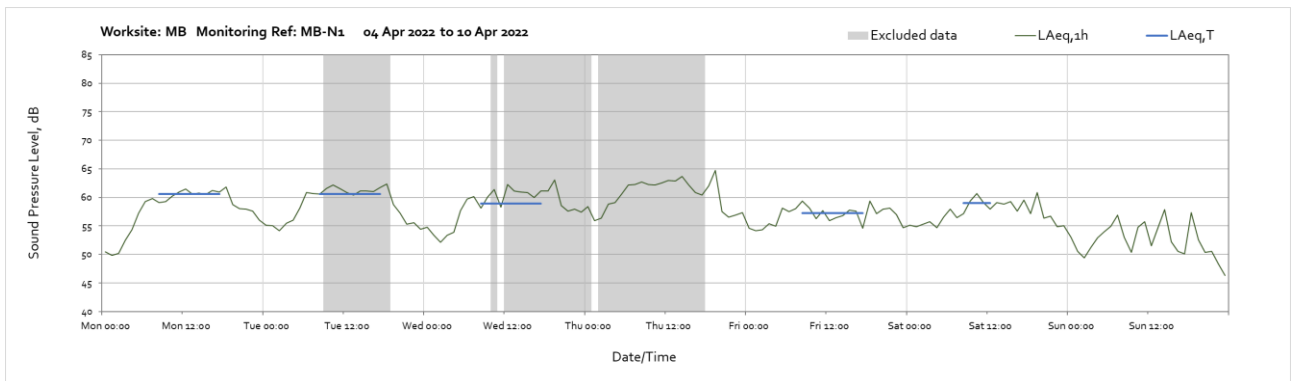
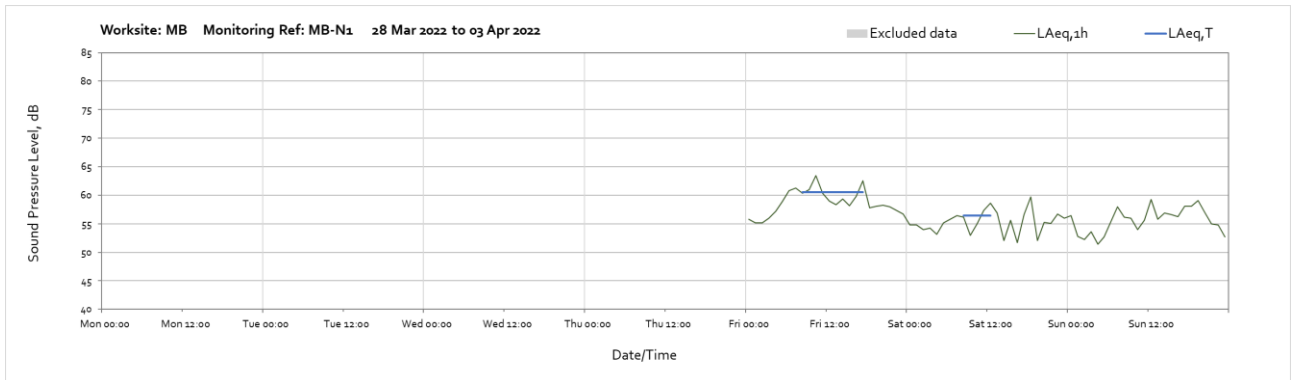


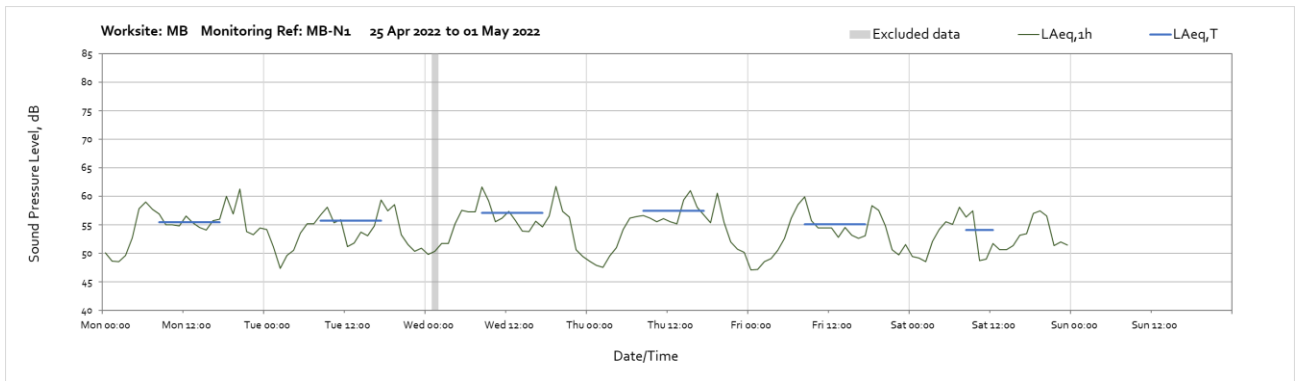
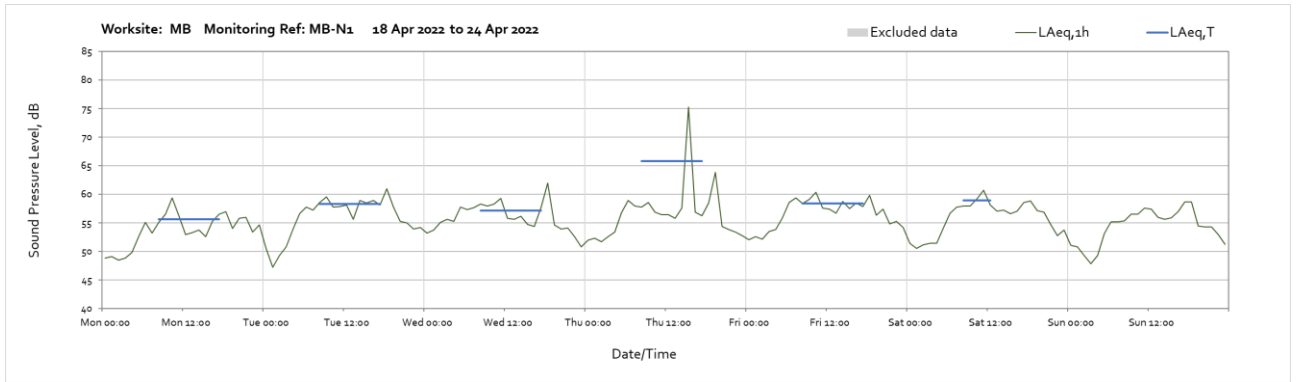
Appendix C Data

Noise

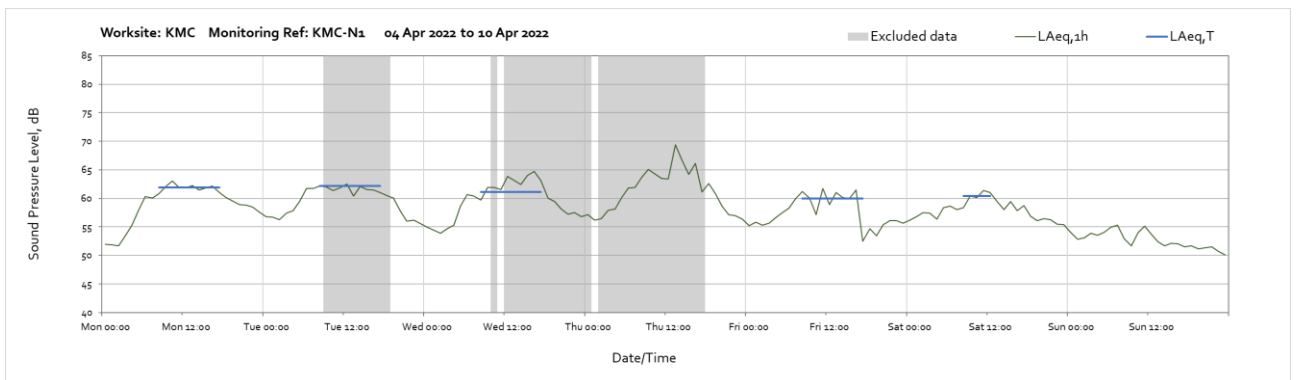
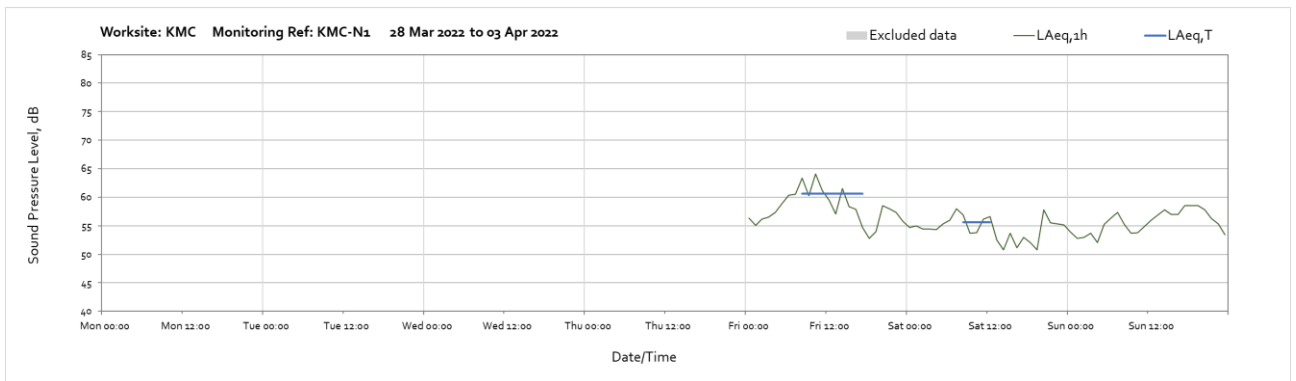
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the $L_{Aeq,T}$ values in **Error! Reference source not found.** of the main report.

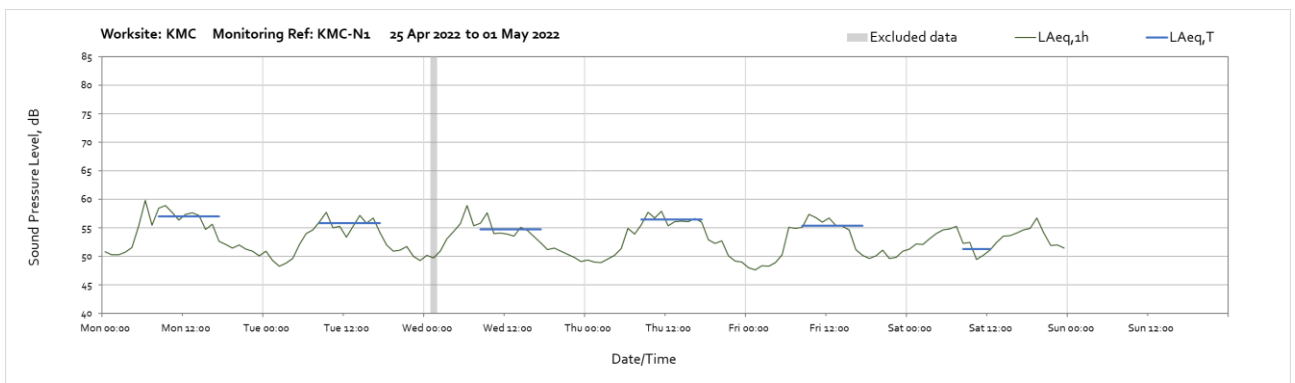
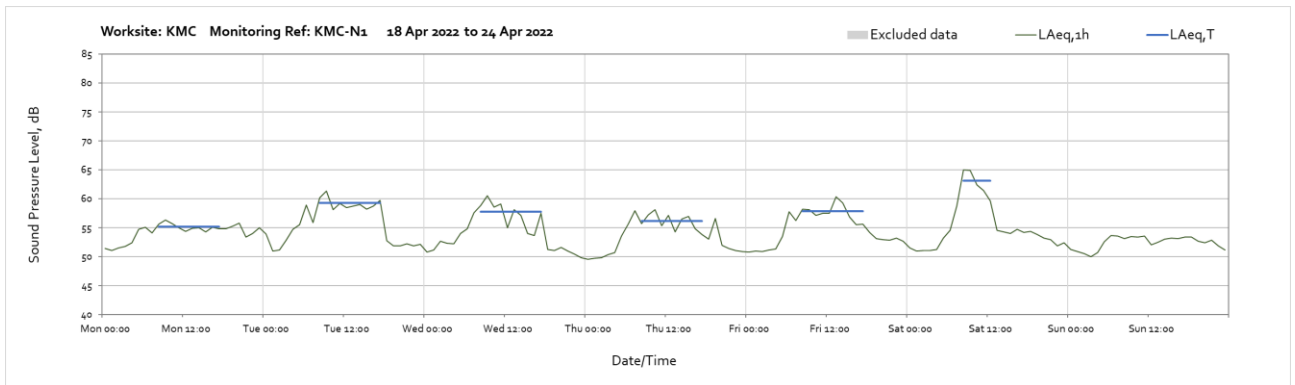
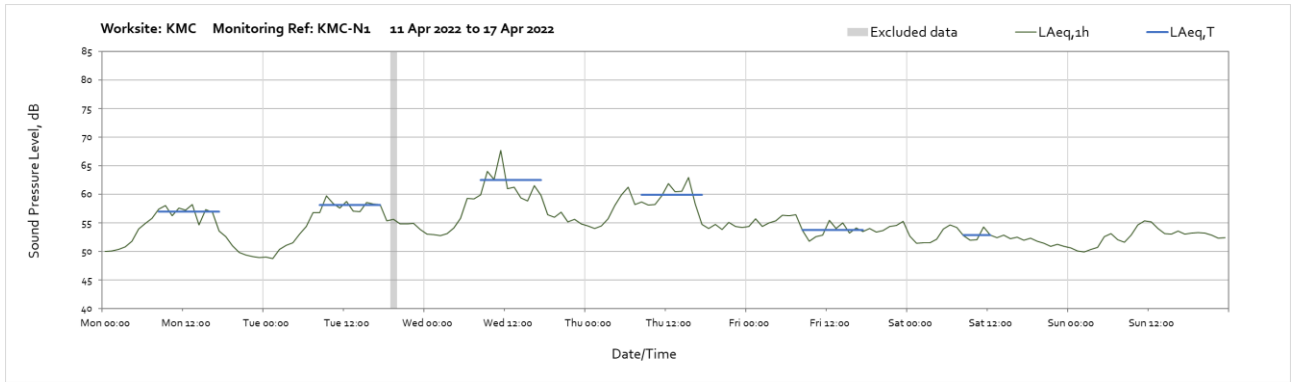
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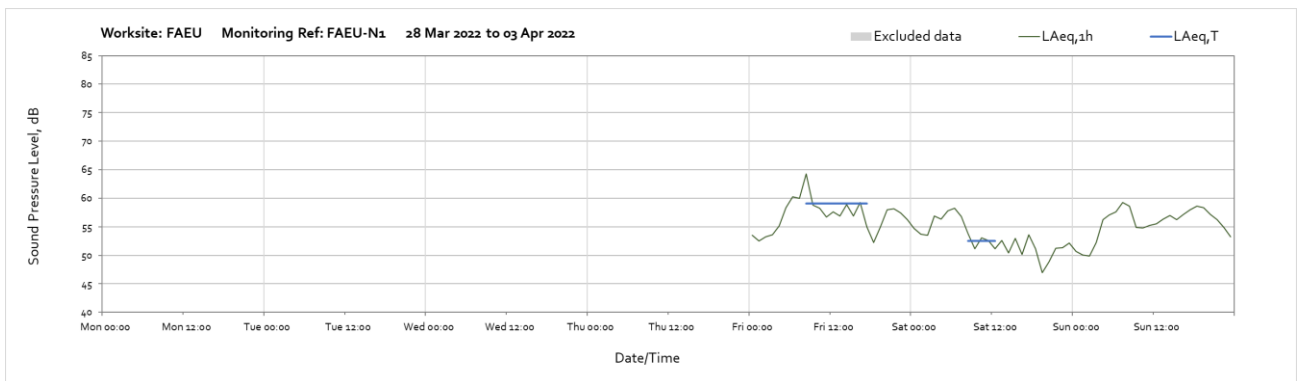


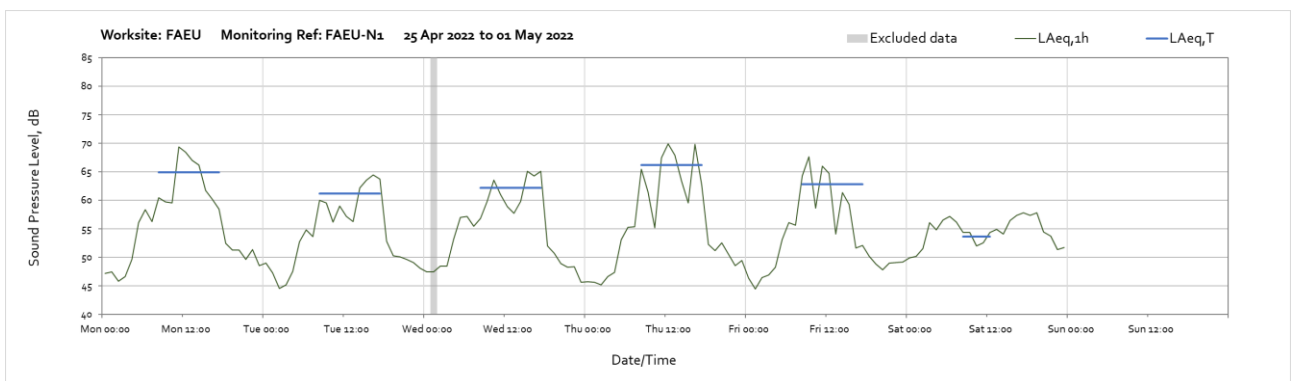
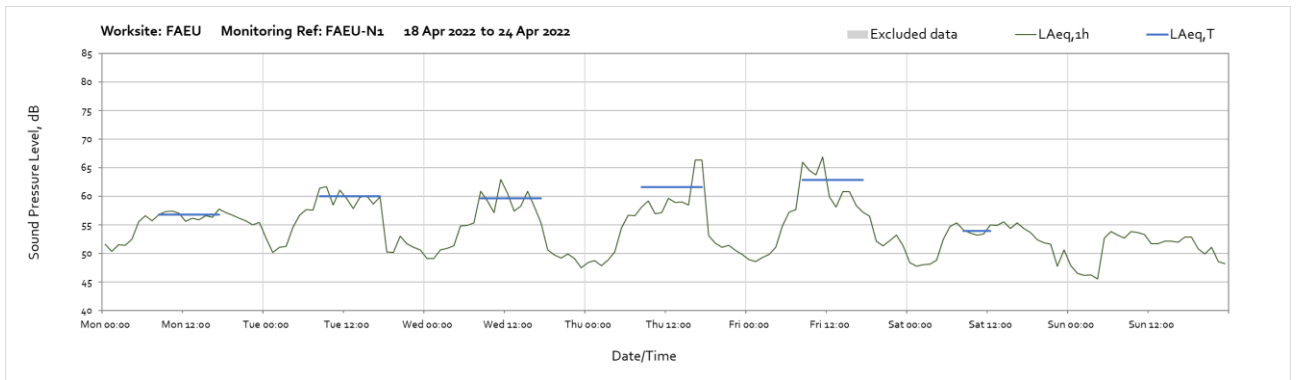
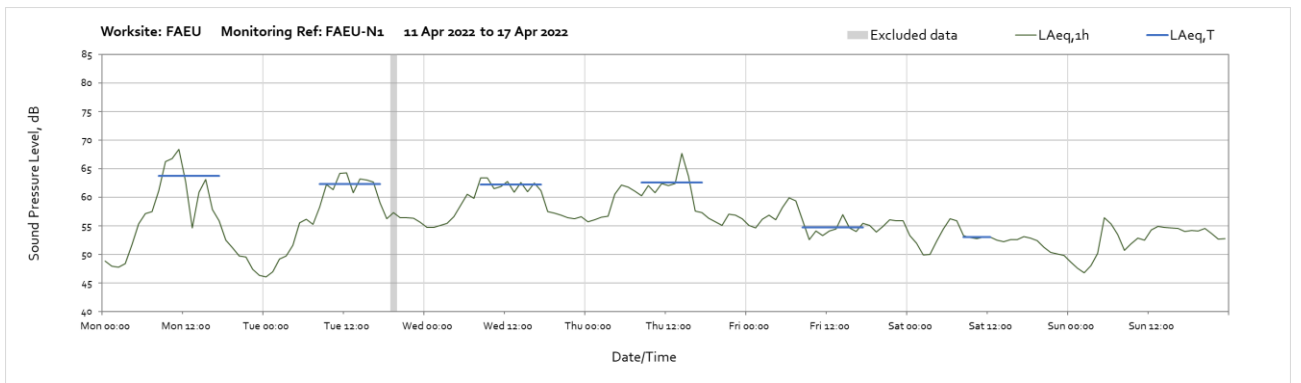
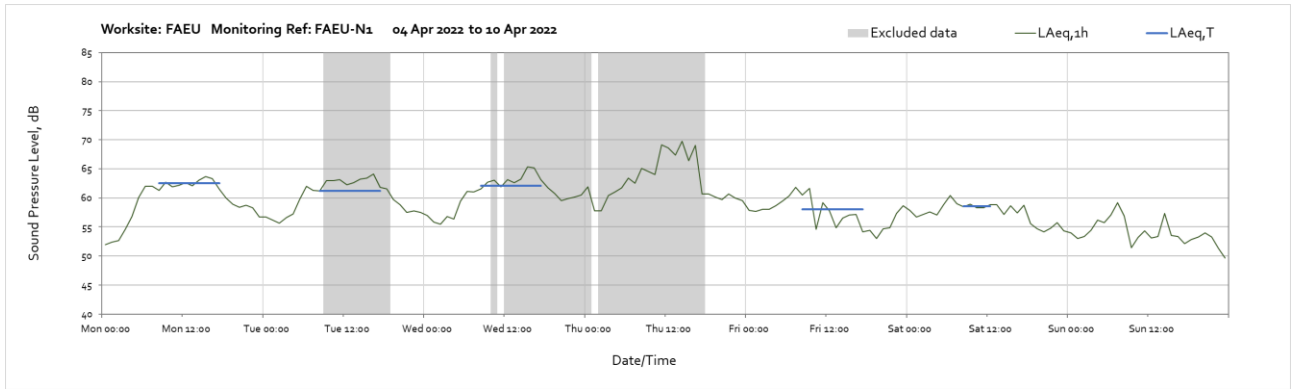
Worksite: KMC – Monitoring Ref: KMC-N1



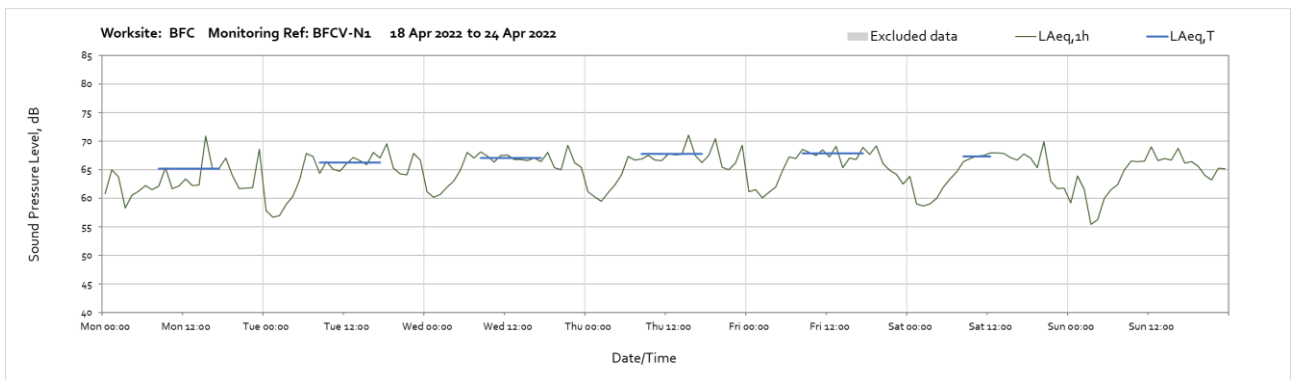
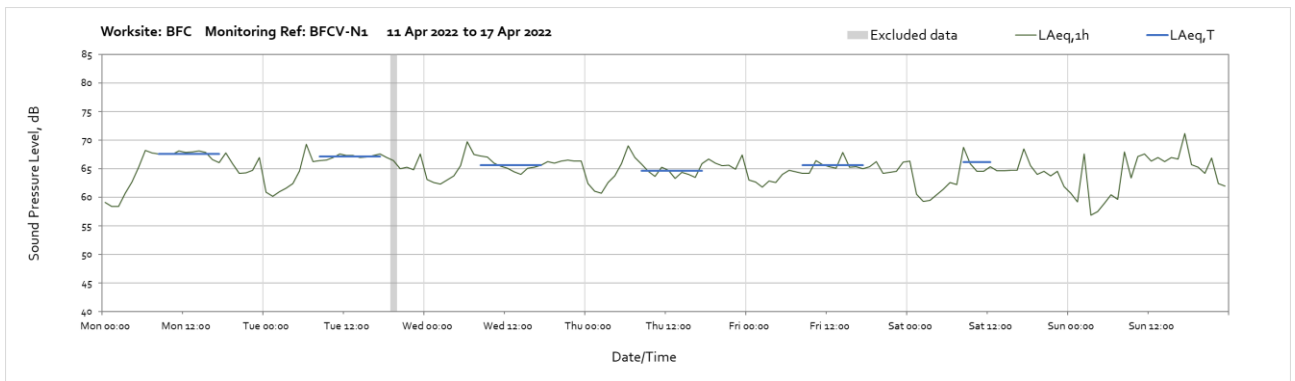
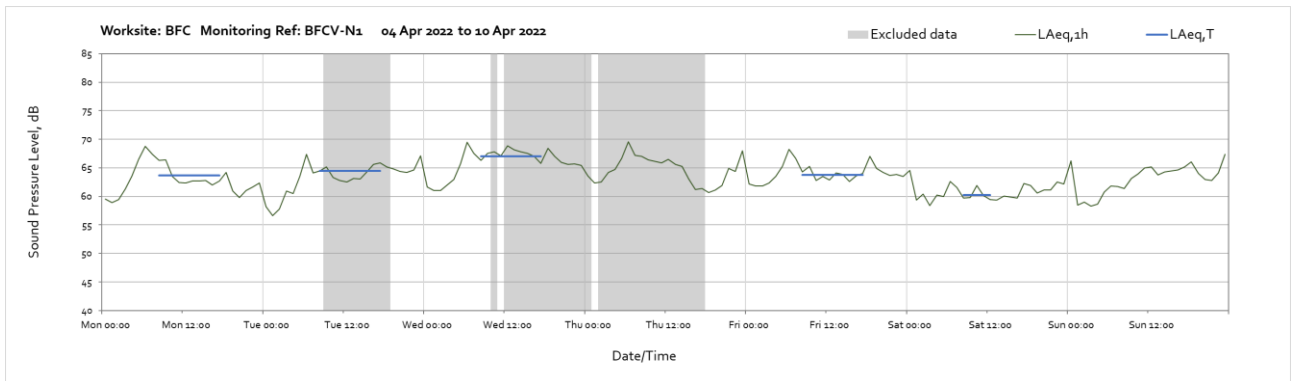


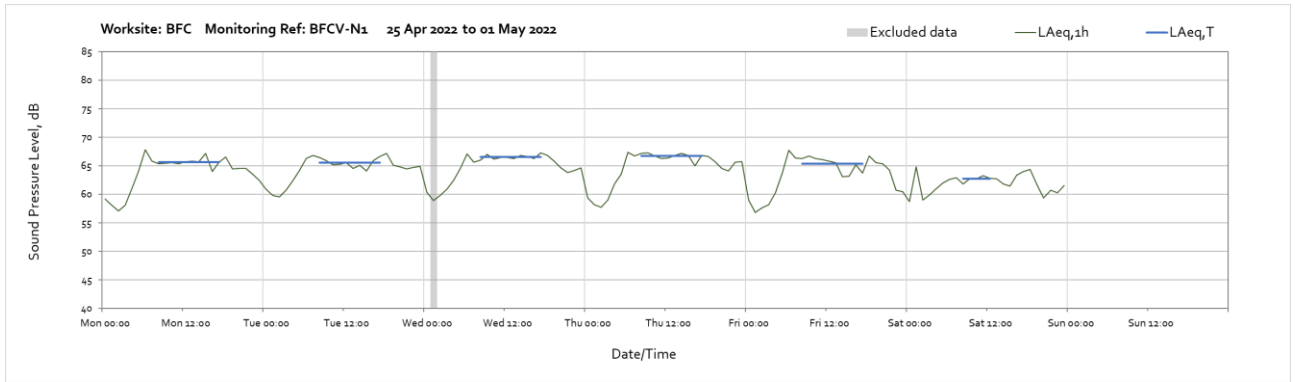
Worksite: FAEU – Monitoring Ref: FAEU-N1



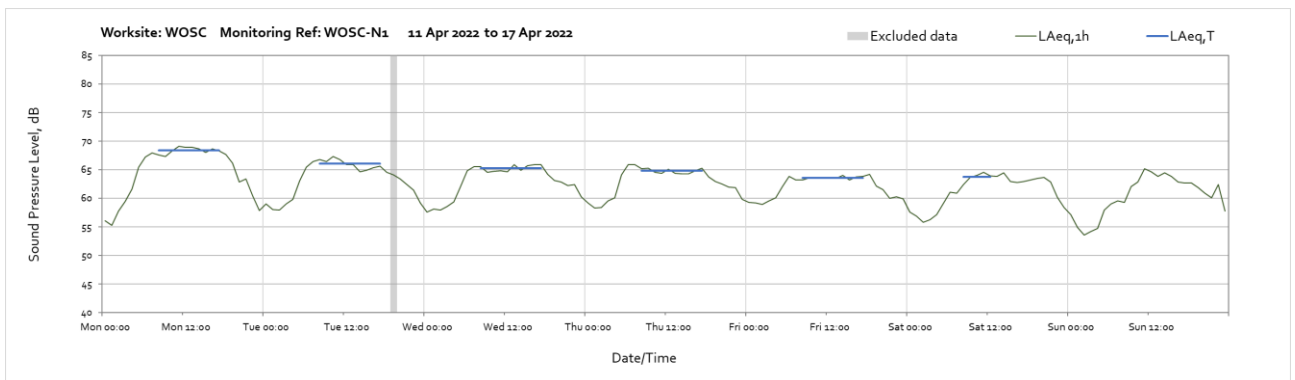
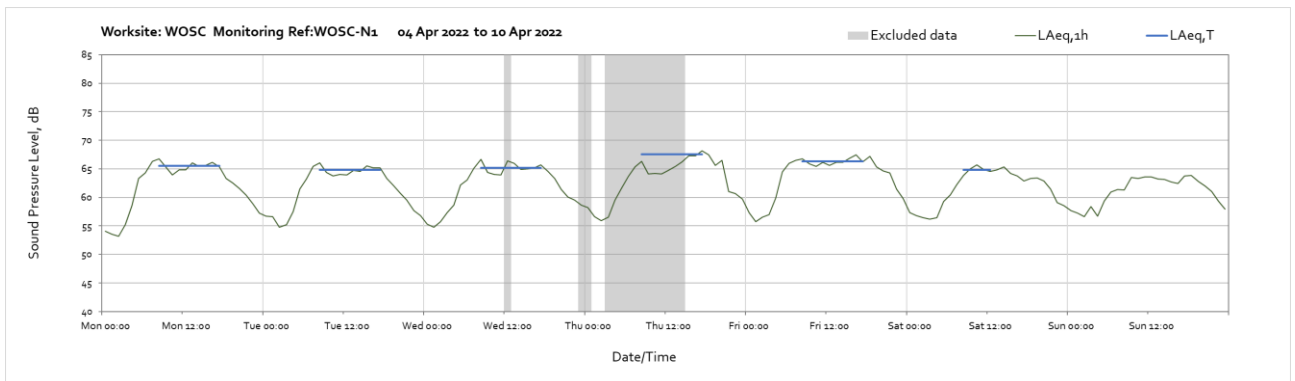
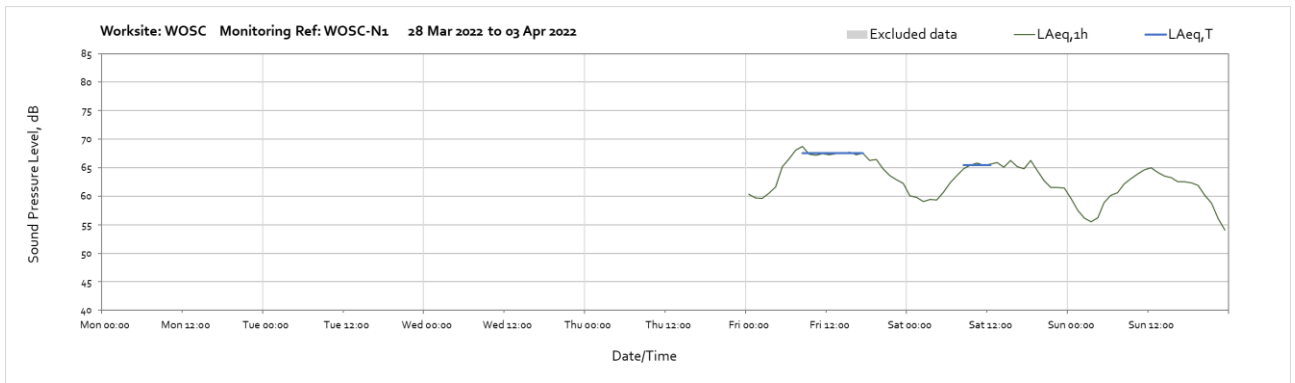


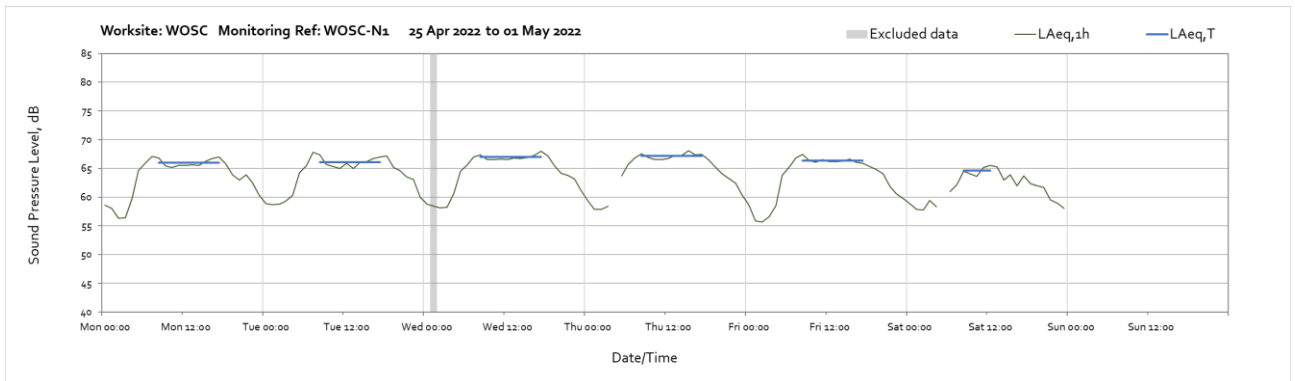
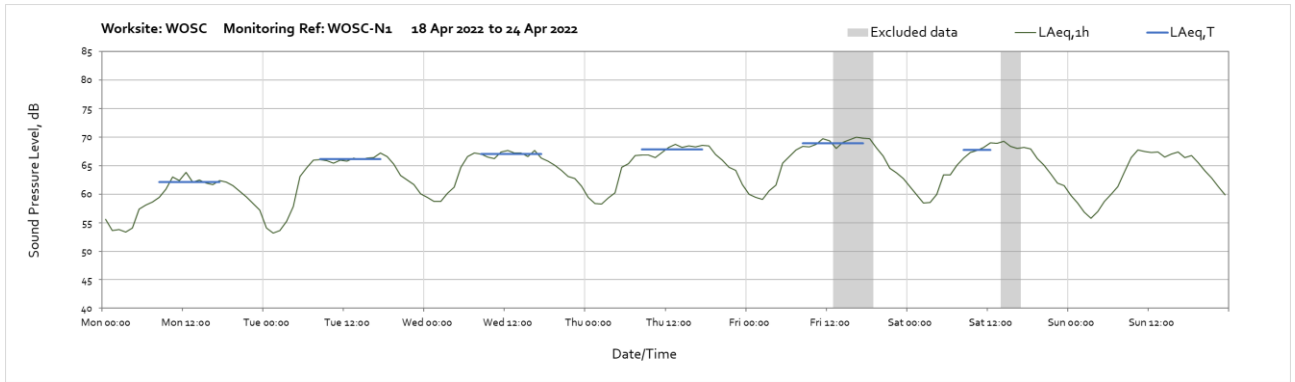
Worksite: BFCV – Monitoring Ref: BFCV-N1





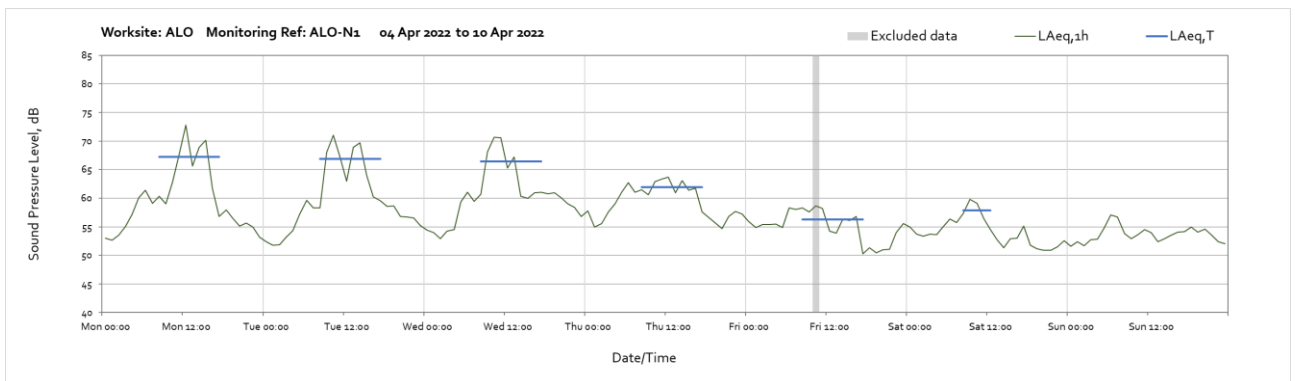
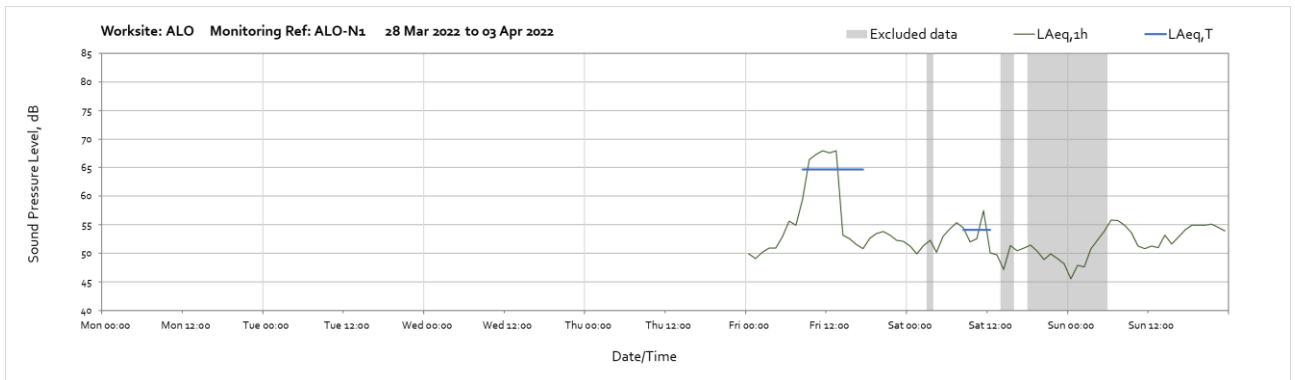
Worksite: WOSC – Monitoring Ref: WOSC-N1

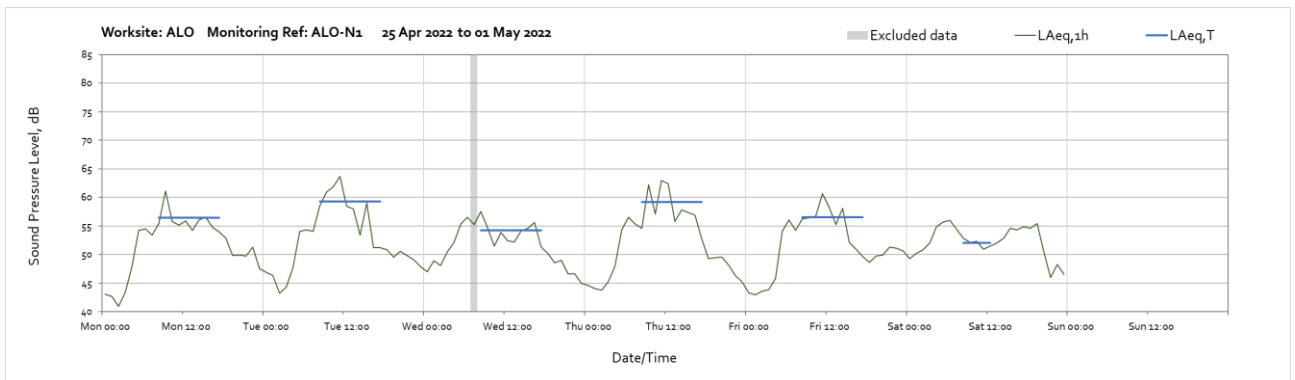
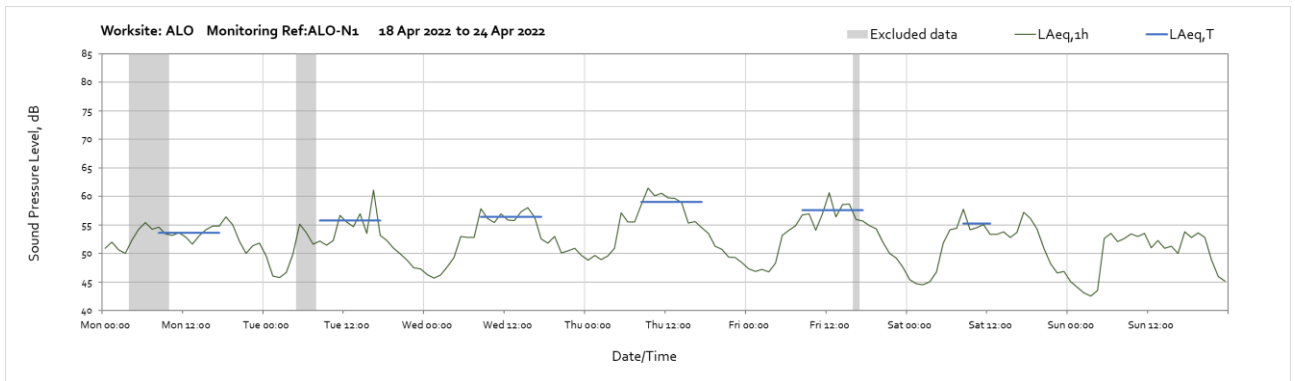
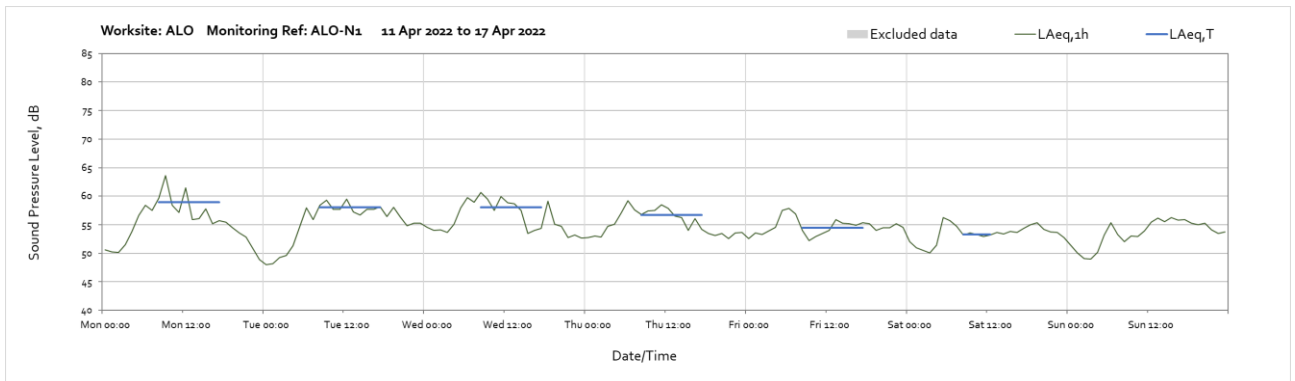




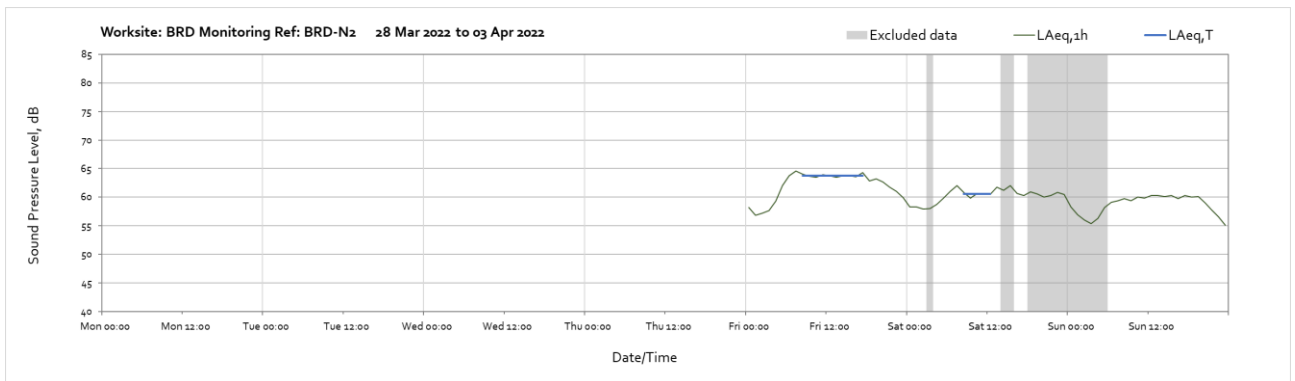
Note: Missing data at 04:00 on Thursday 28th April and at 05:00 on Saturday 30th April was due to a system glitch.

Worksite: ALO – Monitoring Ref: ALO-N1

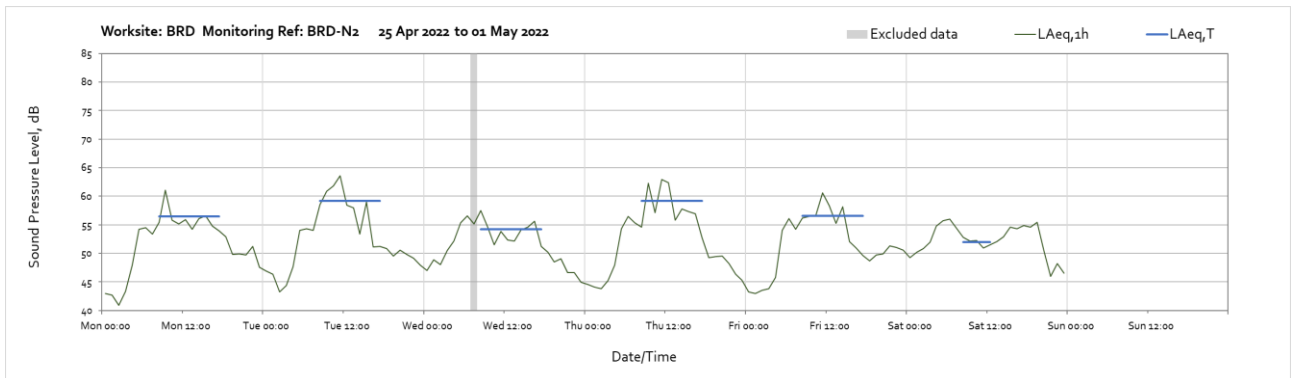
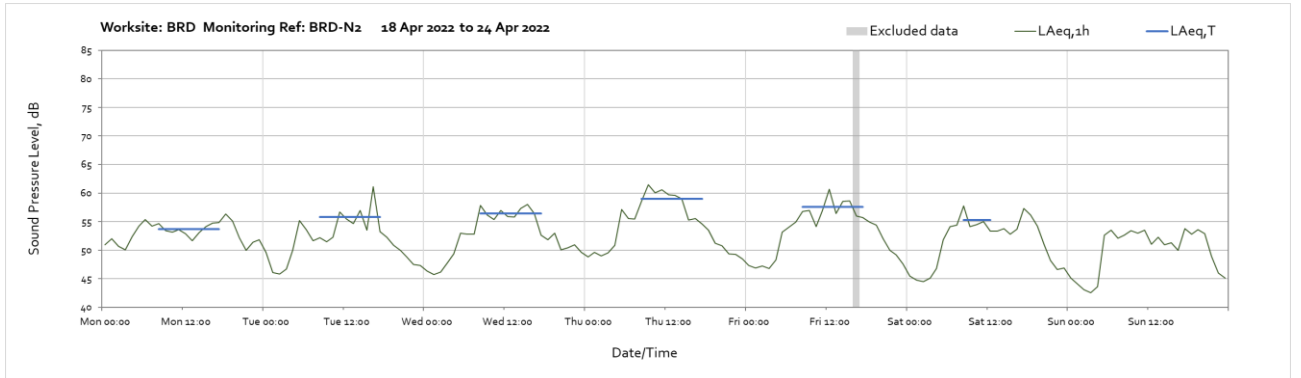
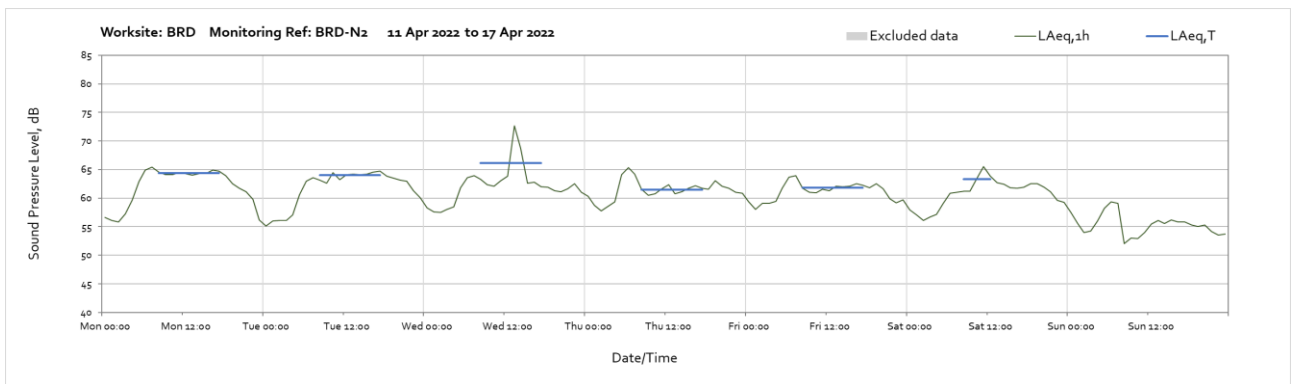
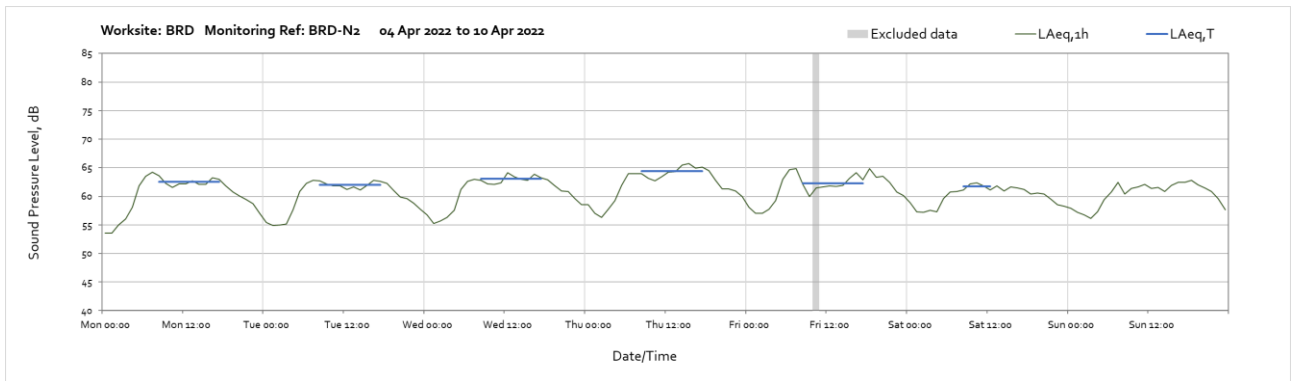




Worksite: BRD - Monitoring Ref: BRD-N2



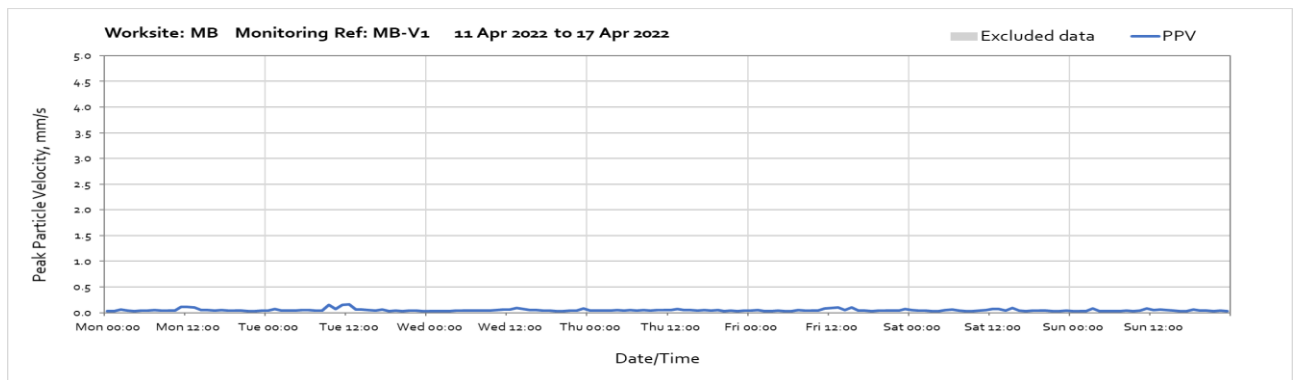
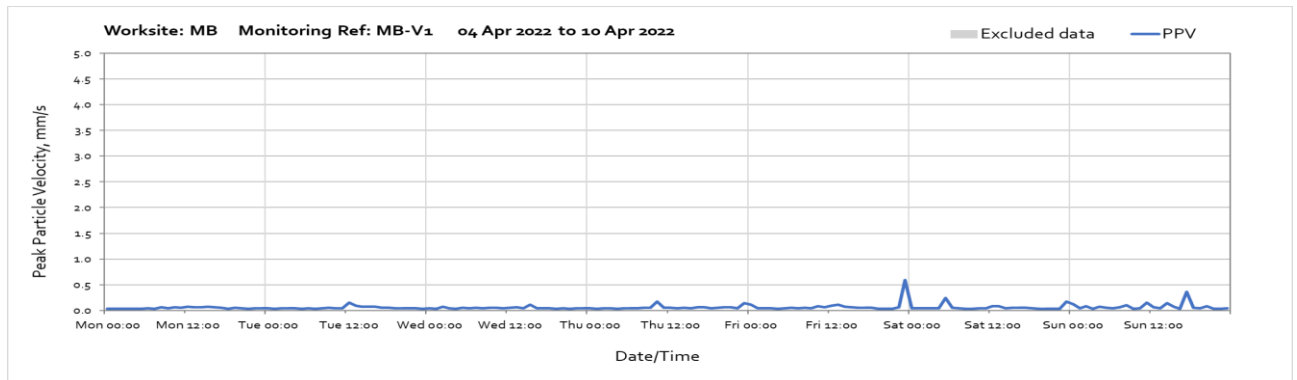
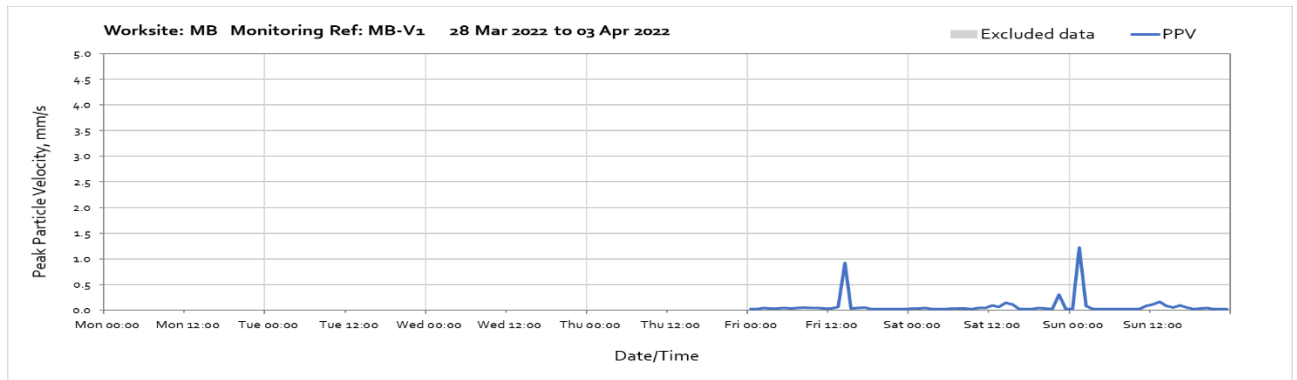
OFFICIAL

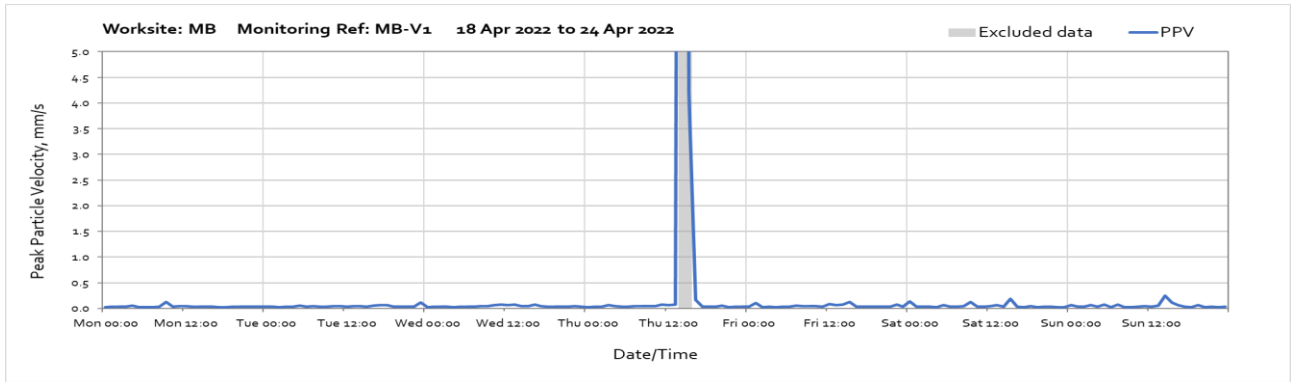


Vibration

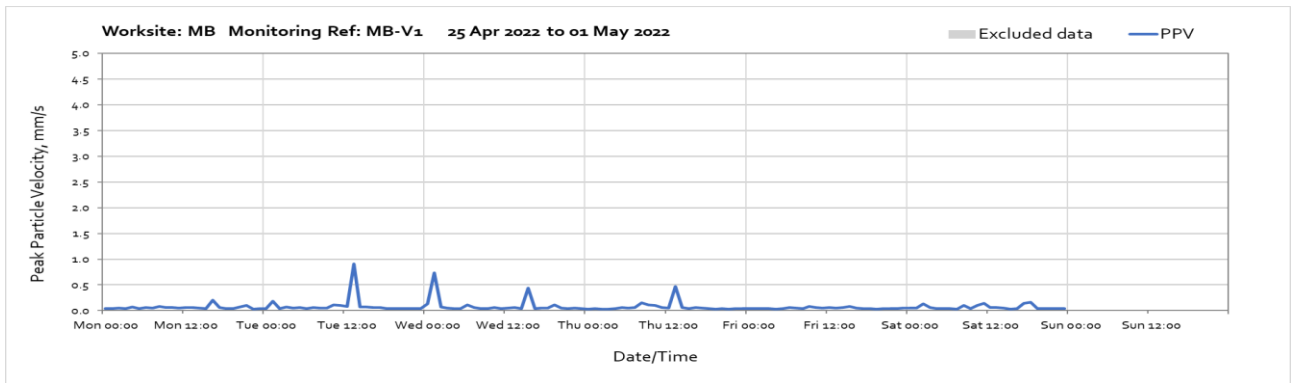
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axes x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative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

Worksite: MB – Monitoring Ref: MB-V1

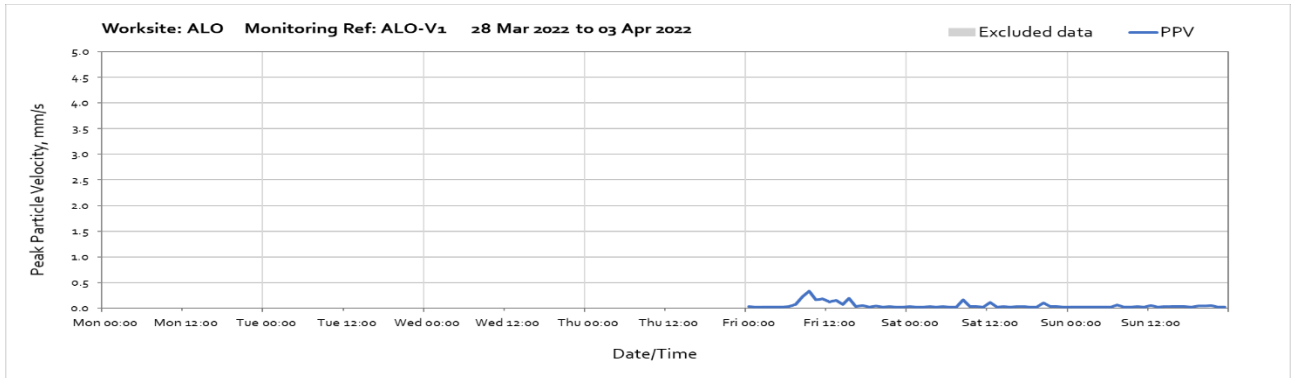


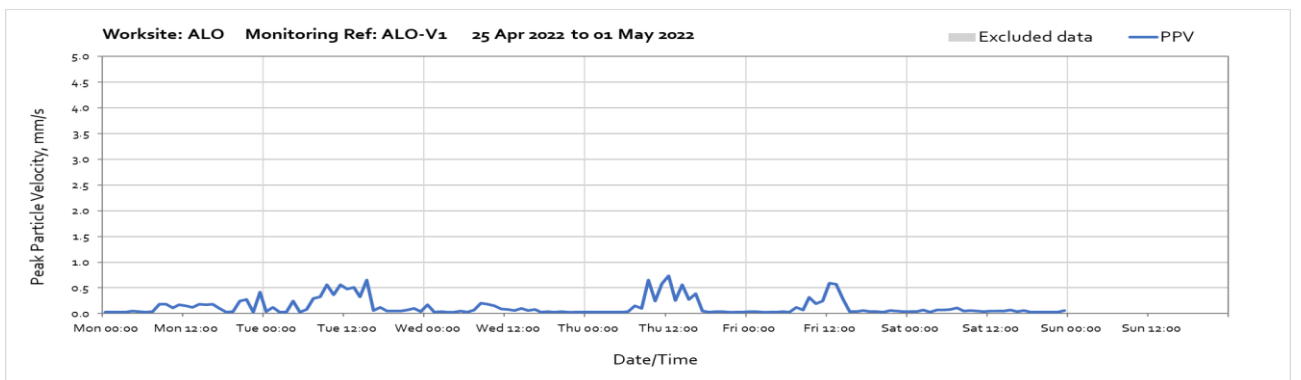
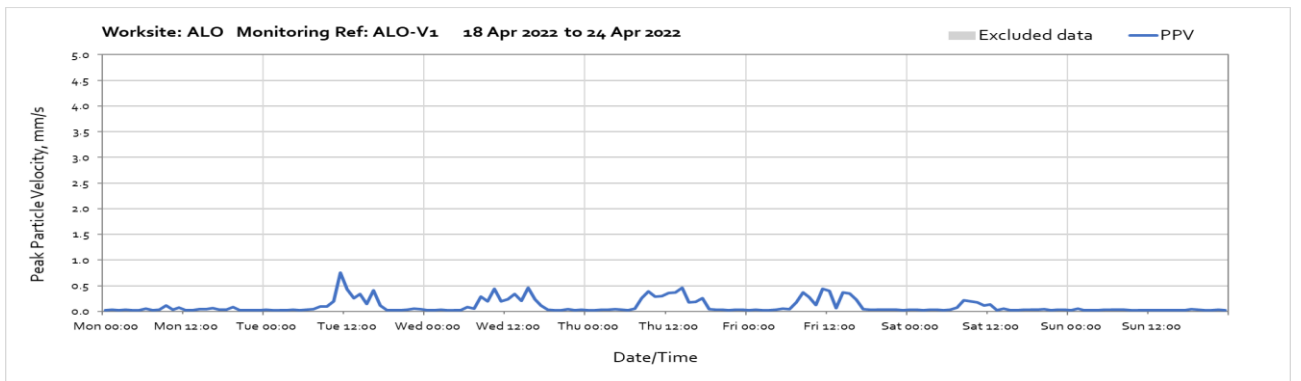
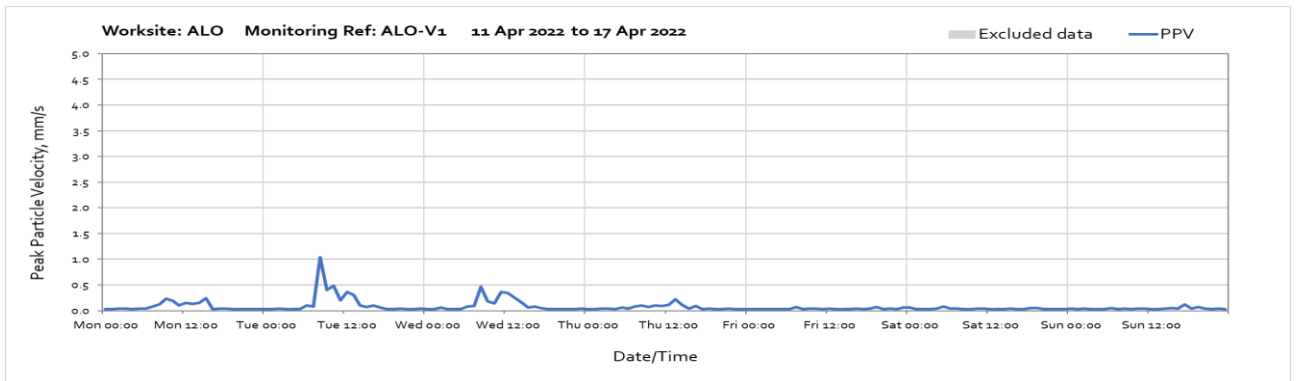
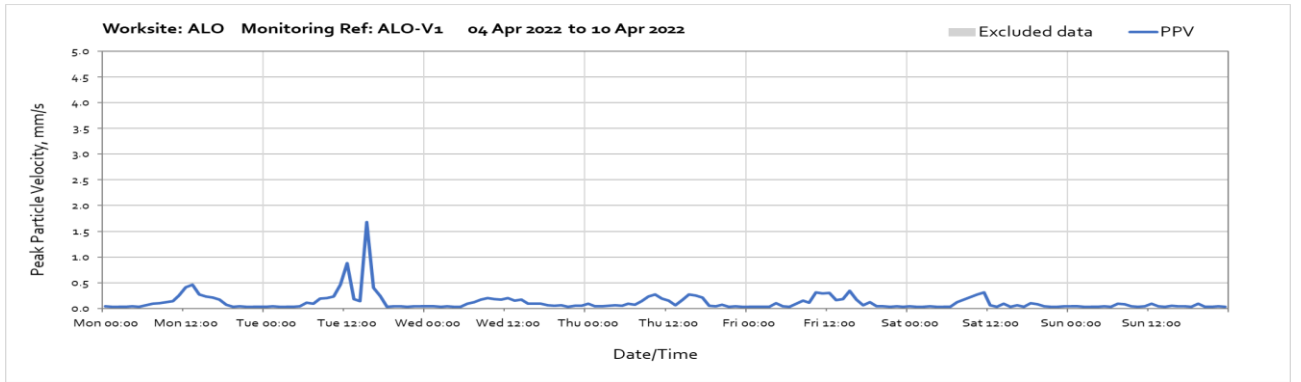


Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.

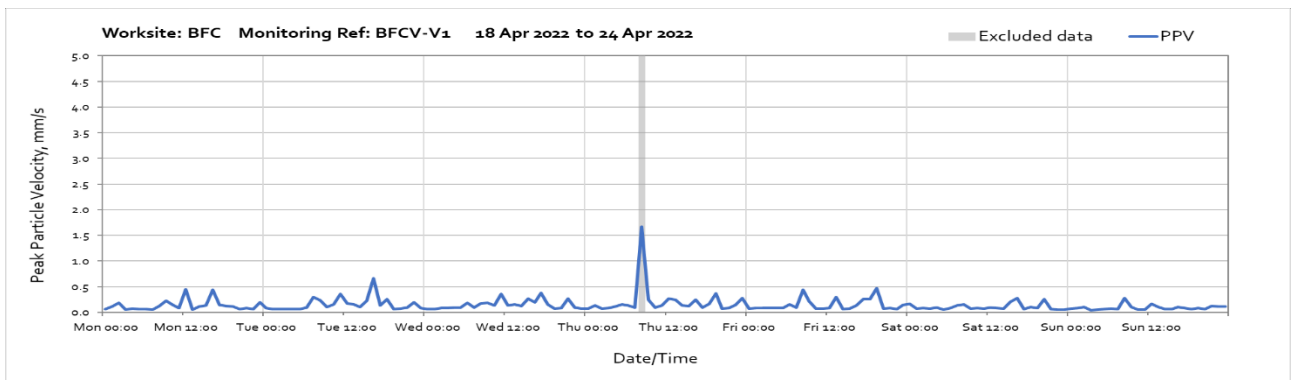
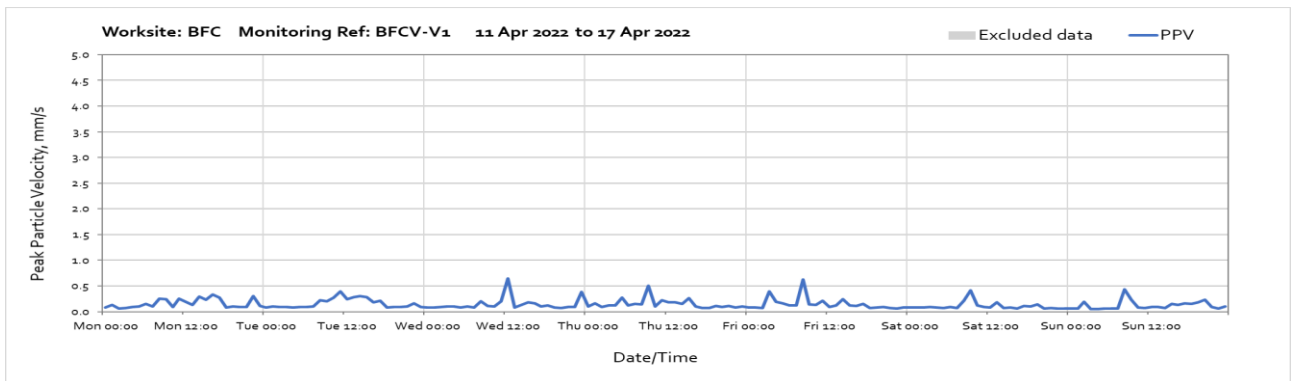
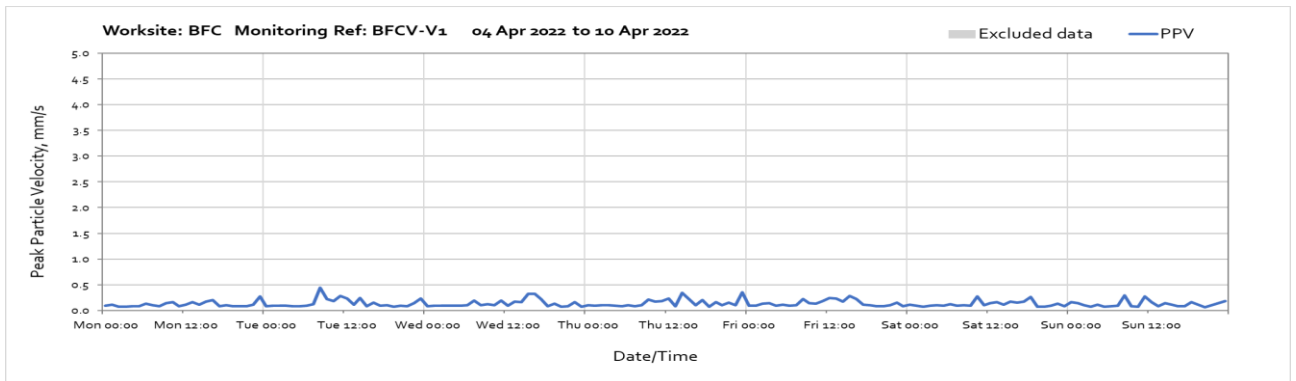
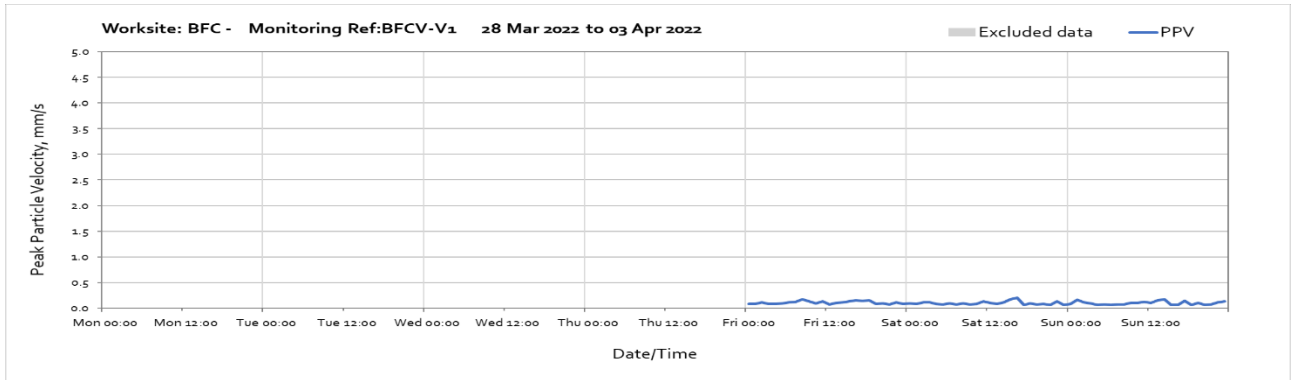


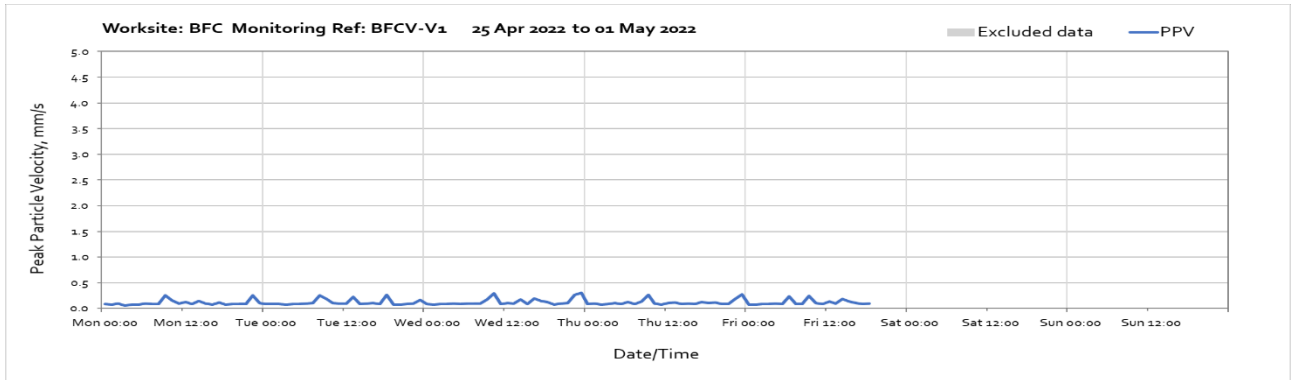
Worksite: ALO – Monitoring Ref: ALO-V1





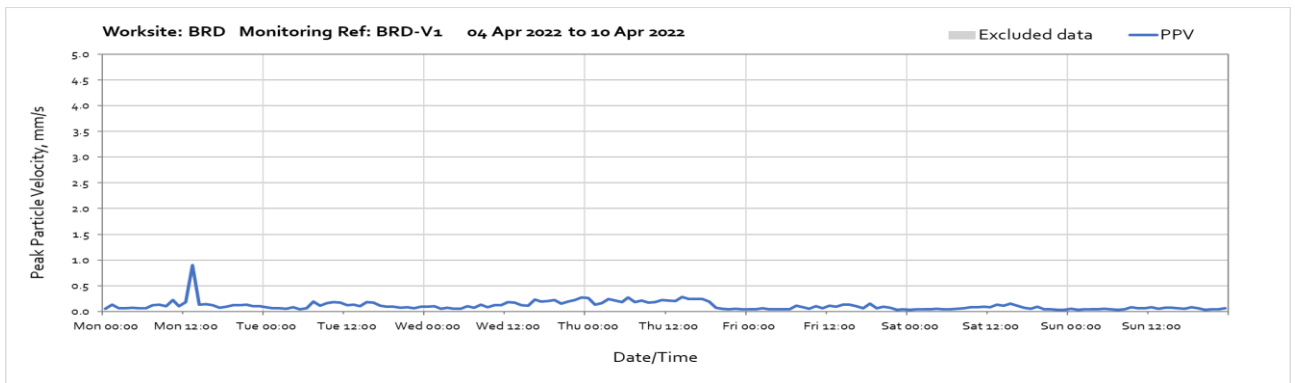
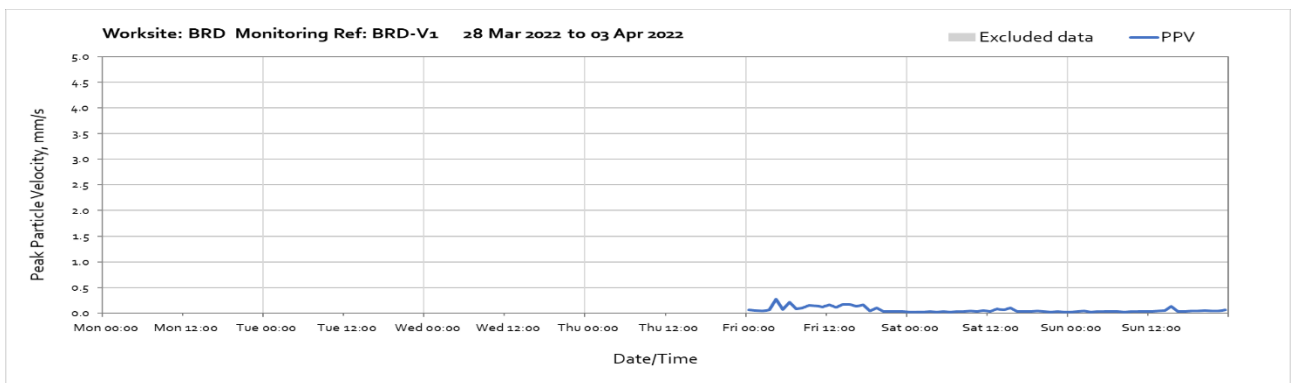
Worksite: BFCV – Monitoring Ref: BFCV-V1

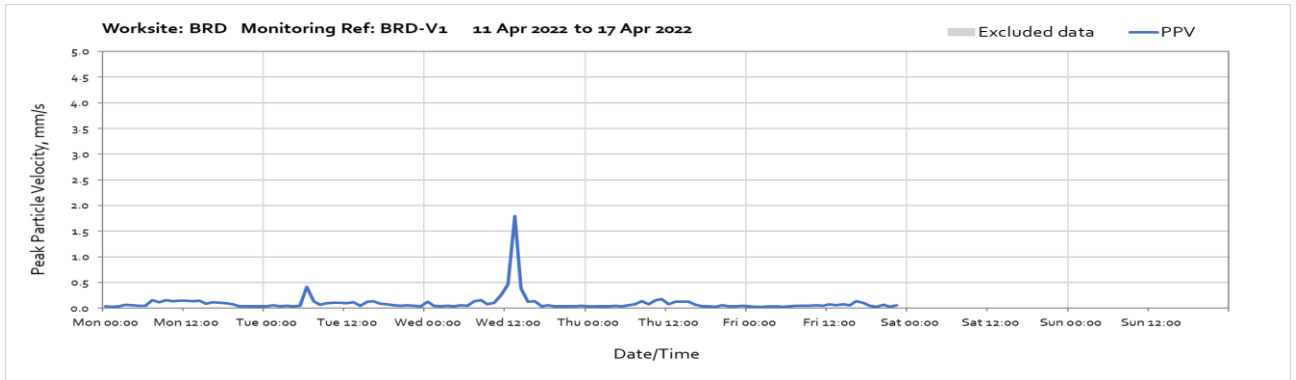




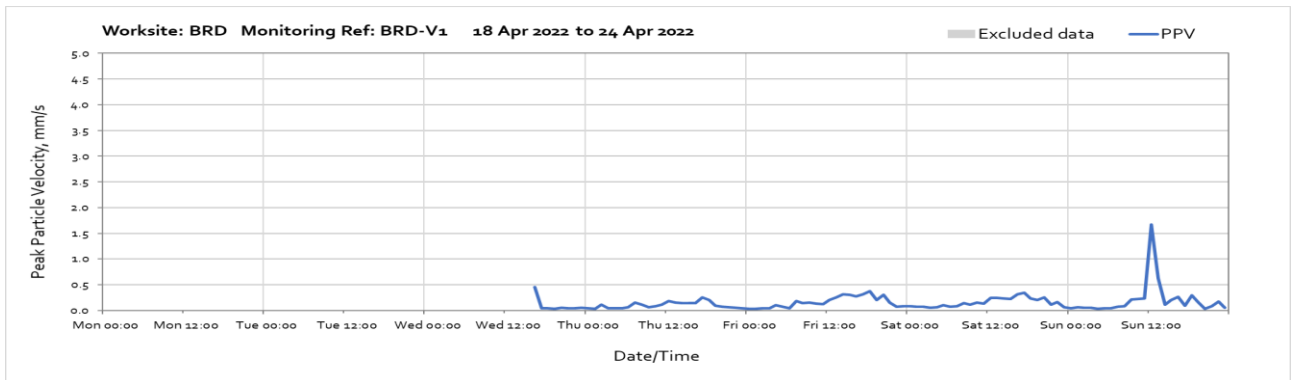
Note: Missing data from 19:00 on Friday 29th April to the end of the month was due to a system glitch

Worksite: BRD - Monitoring Ref: BRD-V1





Note: Missing data from 23:00 on Friday 15th April to 15:00 on Wednesday 20th April was due to a system glitch.



Note: Missing data from 23:00 on Friday 15th April to 15:00 on Wednesday 20th April was due to a system glitch.

