

## **Construction noise and vibration Monthly Report – October 2020**

### **Birmingham City**

|  |           |
|--|-----------|
| <b>Non-Technical Summary</b>             | <b>1</b>  |
| <b>Abbreviations and Descriptions</b>    | <b>2</b>  |
| <b>1 Introduction</b>                    | <b>3</b>  |
| 1.2 Measurement Locations                | 4         |
| <b>2 Summary of Results</b>              | <b>5</b>  |
| 2.1 Summary of Measured Vibration Levels | 5         |
| 2.2 Exceedances of Trigger Level         | 5         |
| 2.3 Complaints                           | 6         |
| <b>Appendix A Site Locations</b>         | <b>7</b>  |
| <b>Appendix B Monitoring Locations</b>   | <b>9</b>  |
| <b>Appendix C Data</b>                   | <b>11</b> |

**List of tables**

|  |   |
|--|---|
| Table 1: Table of Abbreviations  | 2 |
| Table 2: Monitoring Locations  | 4 |
| Table 3: Summary of Measured Component PPV Data over the Monitoring Period | 5 |
| Table 4: Summary of Exceedances of Trigger Levels                          | 5 |
| Table 5: Summary of Complaints   | 6 |

# 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 Birmingham City during the month of October 2020.

Within this period vibration monitoring was undertaken in the vicinity of the Museum Collection Centre worksite (ref.: MCC). No works were carried out at this site in the month of October.

Further works, where monitoring did not take place, were also undertaken at:

- Washwood Heath (heartland spoil heap bund and earthworks);
- Parkhall/Attleborough Lane (fuel pipeline diversion);
- South of Duddeston Mill Road (sewer pipe diversion);
- Landor Street (works at substation);
- Duddeston Mill Rd (station diversion);
- Lawley Middleway (high voltage cable diversion);
- Curzon Street (works at substation and cable diversion).

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 +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.   |
| Free-field   | A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.   |
| LOAEL  | Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.  |
| Peak particle velocity, or PPV                             | Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.   |
| SOAEL  | Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.   |
| Sound pressure level                                       | The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.  |
| Vibration dose value, or VDV                               | An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$ .                |

# 1 Introduction

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

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

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 vibration data, and interpretation thereof, for monitoring carried out by HS2 within Birmingham City for the period 1<sup>st</sup> to 31<sup>st</sup> October 2020.

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

- Museum Collection Centre worksite ref.: MCC (see plan 1 in Appendix A):
  - No works were carried out in the month of October.

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

- Washwood Heath (heartland spoil heap bund and earthworks)
- Parkhall/Attleborough Lane (fuel pipeline diversion);
- South of Duddeston Mill Road (sewer pipe diversion);
- Landor Street (works at substation);
- Duddeston Mill Rd (station diversion);
- Lawley Middleway (high voltage cable diversion);
- Curzon Street (works at substation and cable diversion).

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

## 1.2 Measurement Locations

1.2.1 Two vibration monitoring installations were active in October in the Birmingham City area. Table 2 summarises the position of vibration monitoring installations within the Birmingham City area in October 2020.

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

Table 2: Monitoring Locations

| Worksite Reference             | Measurement Reference | Address  |
|--------------------------------|-----------------------|--|
| Museum Collection Centre (MCC) | Vib 1                 | 25 Dolman Street, Birmingham, B7 4RQ (Top Floor) |
|                                | Vib 2                 | 25 Dolman Street, Birmingham, B7 4RQ (Outside)   |

## 2 Summary of Results

### 2.1 Summary of Measured Vibration Levels

2.1.1 Table 3 presents a summary of the measured vibration levels at each monitoring location over the reporting period. The highest component PPV measured during periods of works along any axis is presented in the table.

Table 3: Summary of Measured Component PPV Data over the Monitoring Period

| Worksite Reference             | Measurement Reference | Monitor Address              | Highest PPV measured in any axis, mm/s |
|--------------------------------|-----------------------|------------------------------|--|
| Museum Collection Centre (MCC) | Vib 1                 | 25 Dolman Street (Top Floor) | 1.86 (Z-axis)                          |
|                                | Vib 2                 | 25 Dolman Street (Outside)   | 0.57 (Y-axis)                          |

2.1.2 Appendix C presents graphs of the vibration monitoring data over the month for each of the measurement locations. 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 Trigger Level

2.2.1

2.2.2 Table 4 provides a summary of exceedances of the S61 trigger vibration levels determined to be due to HS2 related construction vibration measured during the reporting period, along with the findings of any investigation.

Table 4: 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 |
|--|--------------------|----------------------|-------------------|---|---------------|
| -  | -                  | -                    | -                 | -   | -             |

## 2.3 Complaints

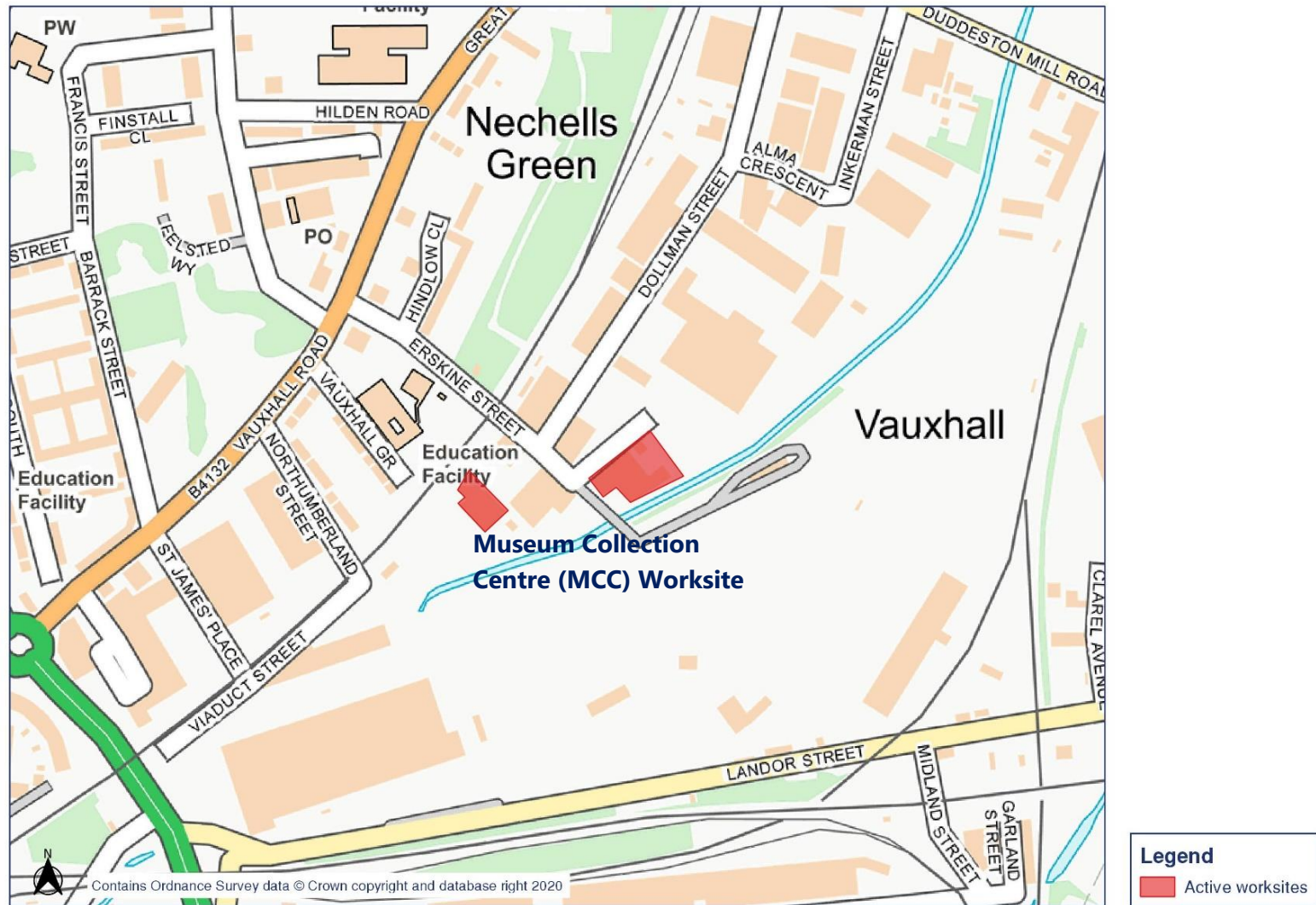
2.3.1 Table 5 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 5: Summary of Complaints

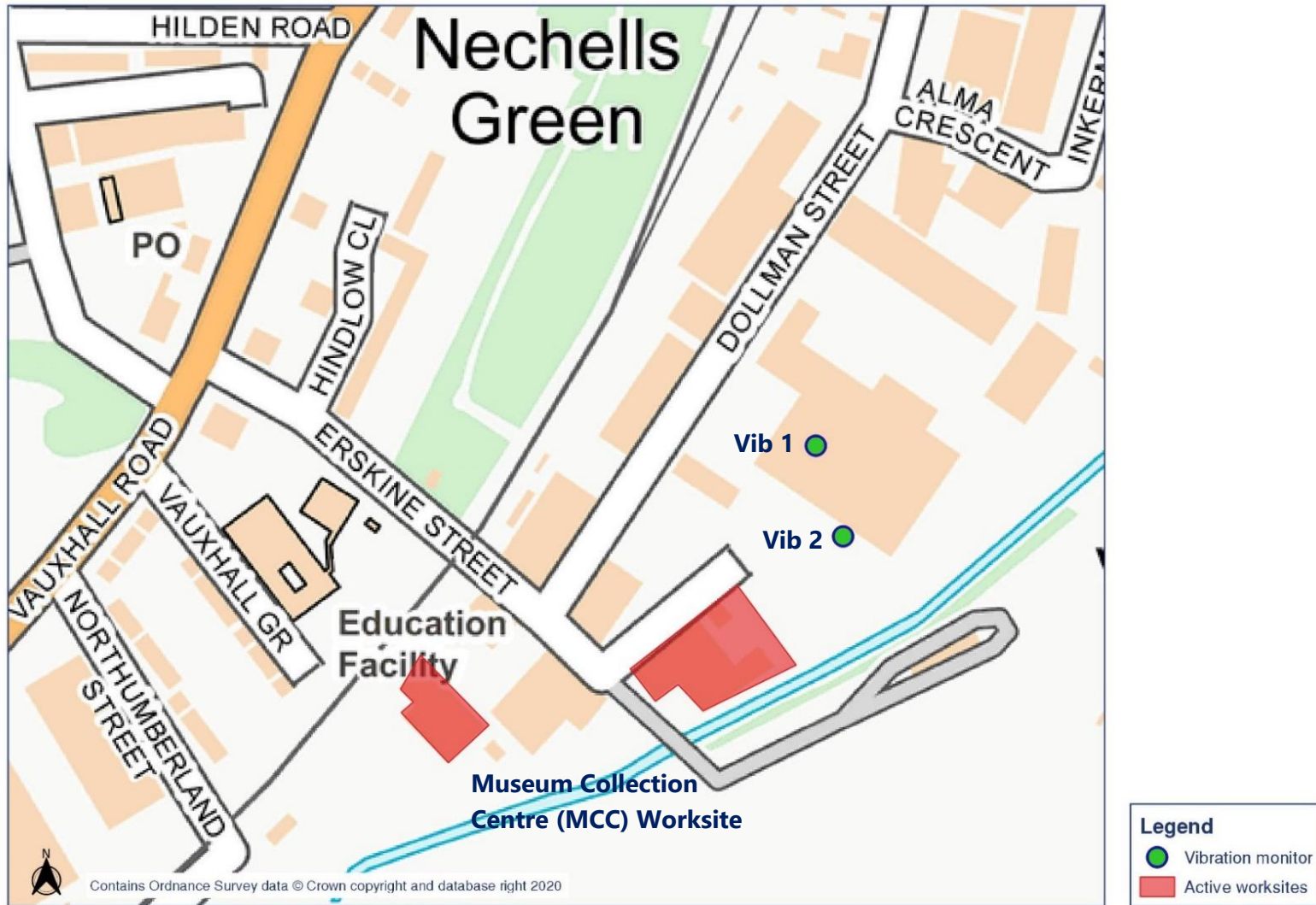
| Complaint Reference Number | Worksite Reference | Description of Complaint | Results of Investigation | Actions Taken |
|----------------------------|--------------------|--------------------------|--------------------------|---------------|
| -                          | -                  | -   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



# Appendix A Site Locations



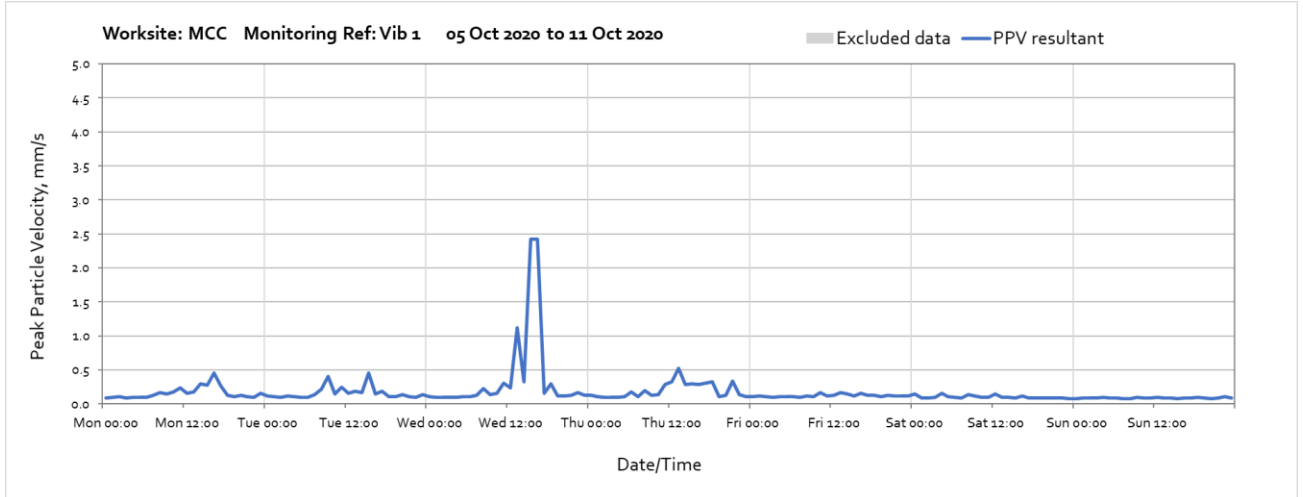
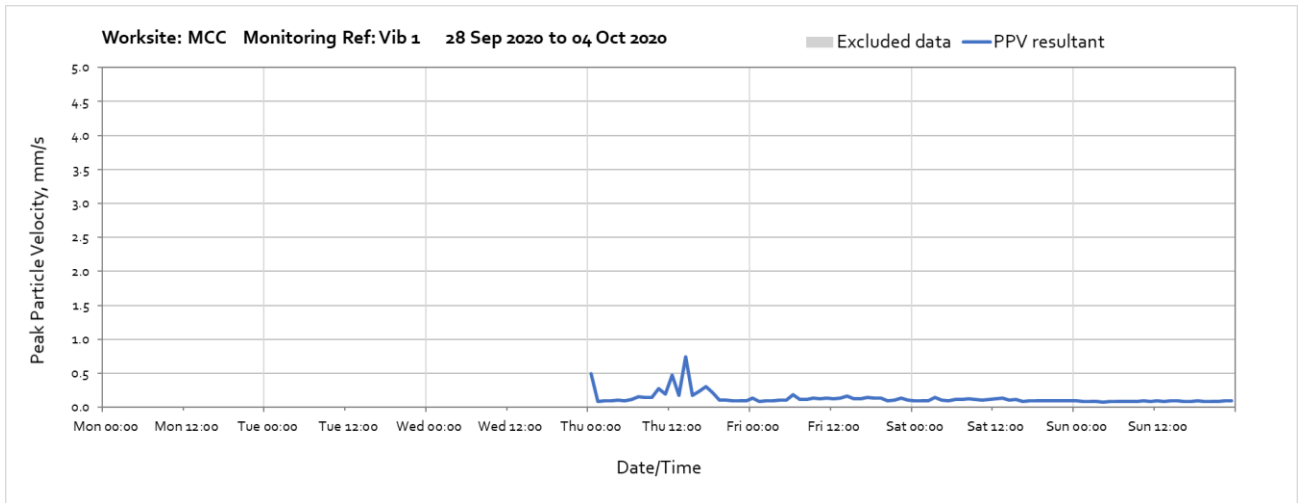
# Appendix B Monitoring Locations

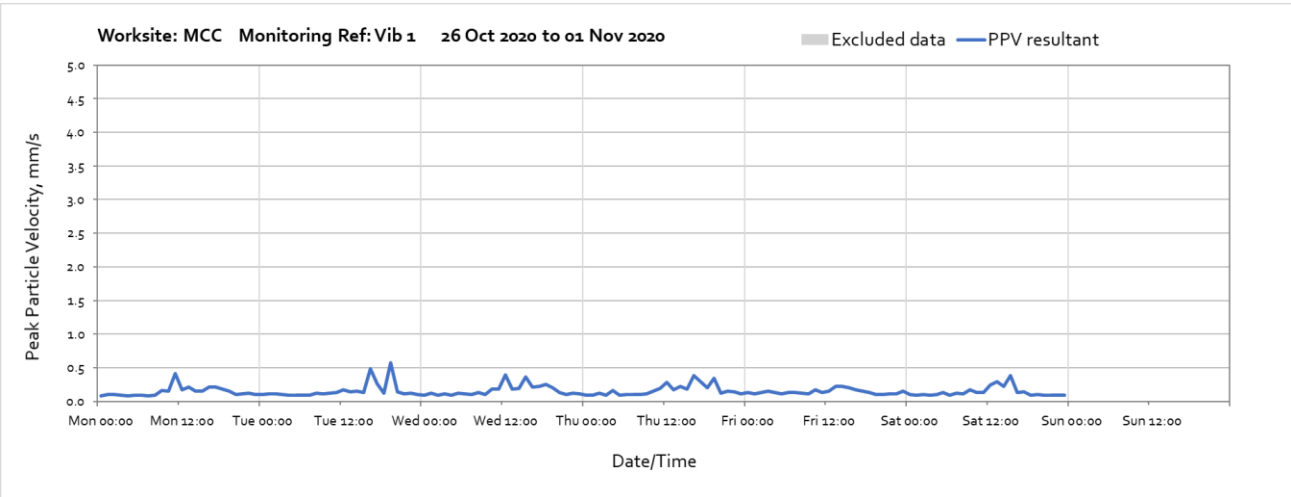
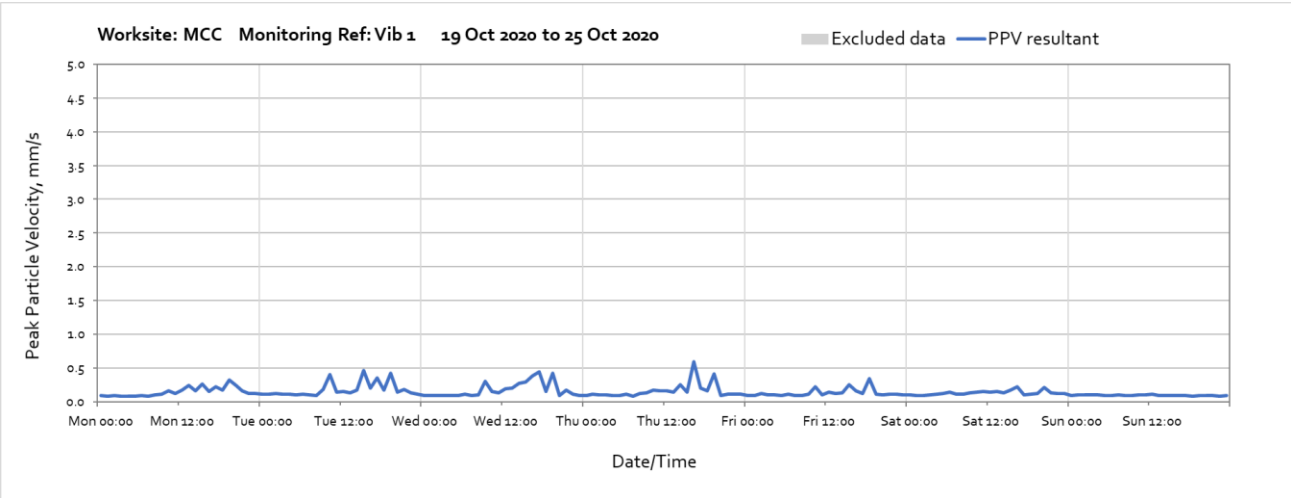
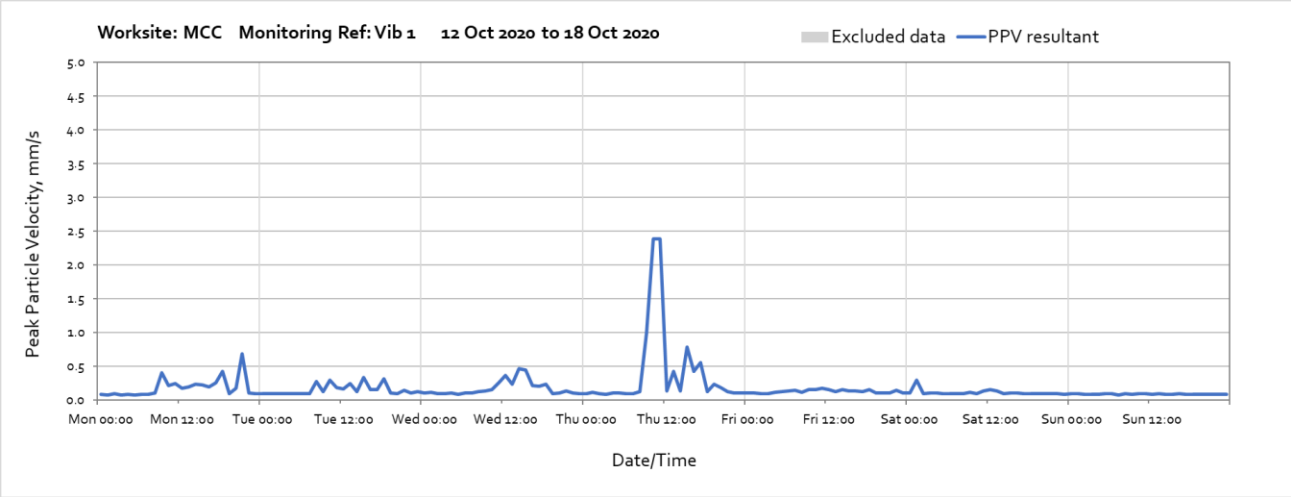


# Appendix C Data

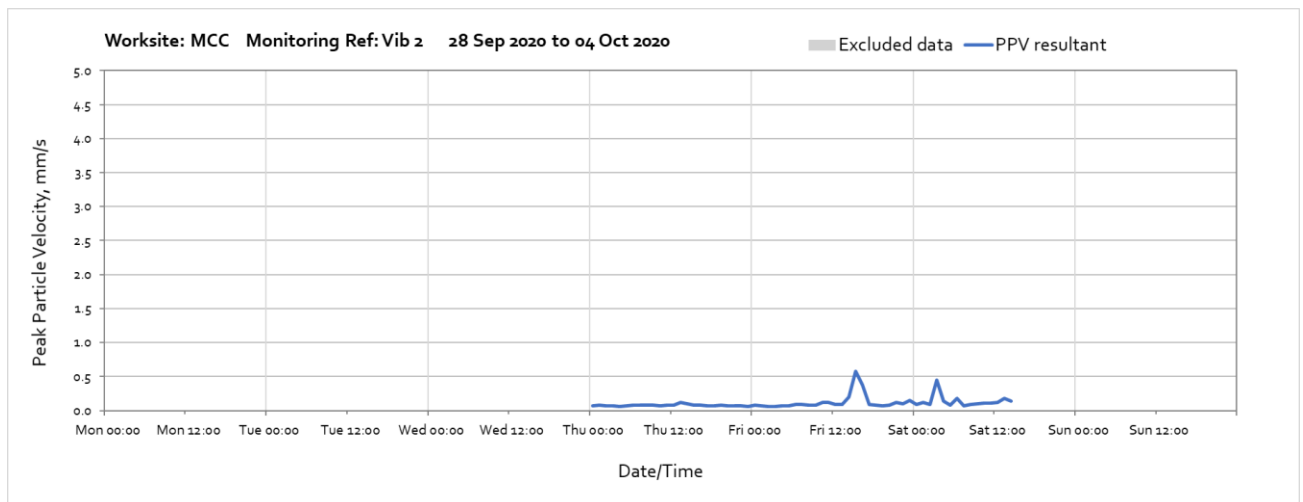
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative of HS2 construction works, these values have been greyed out in the following charts and have been excluded to calculate values in Table 3 of the main report.

## Worksite: Museum Collection Centre (MCC) – Monitoring Ref: Vib 1





## Worksite: Museum Collection Centre (MCC) – Monitoring Ref: Vib 2



Note: Missing data from 15:00 on 3<sup>rd</sup> October 2020 was due to loss of the signal, the monitor has since been upgraded to a more stable data connection.