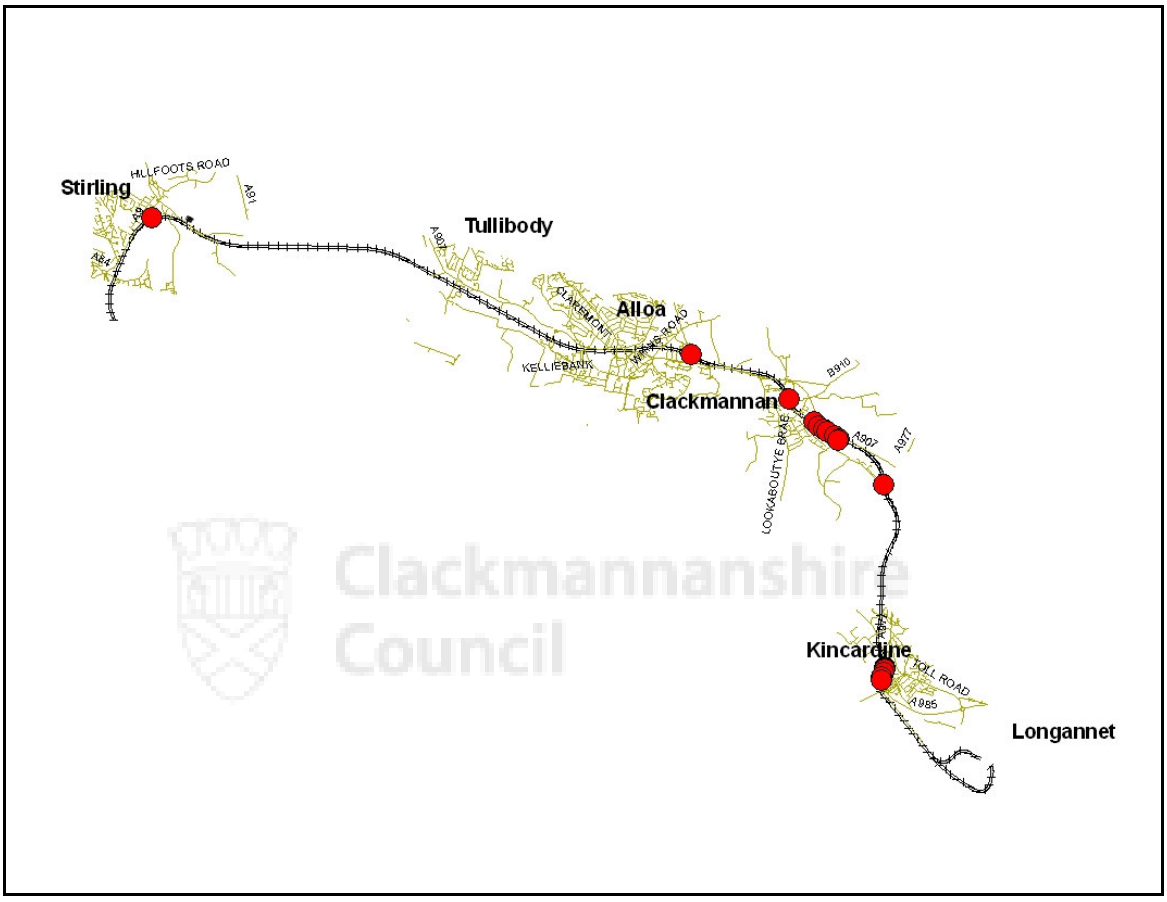
5 Rail Vibration Measurement Results and Assessment

Overview

5.1 Rail vibration measurements were undertaken at 18 residential properties along the SAK railway line between 17 and 25 November 2010. The measurements were made at times when suitable access was available. Typically, measurements were concurrently undertaken at three properties for a twenty-four hour time period. Figure 5.1 gives an overview of the SAK route, with the measurement locations shown as red dots. For the purpose of this report the measurements are listed in a geographic order from west to east.

Figure 5.1: Overview of SAK Railway Line



5.2 For each measurement location, a graphic time history is given. To facilitate the direct comparison of results the scale of each graph is identical..

5.3 Network Rail has provided information on the expected freight train movements. There are 12 freight paths in each direction within a 24-hour period. Trains have 19 to 23 wagons and one locomotive. Each train in the direction of Longannet can be expected to be loaded. Each return train would be

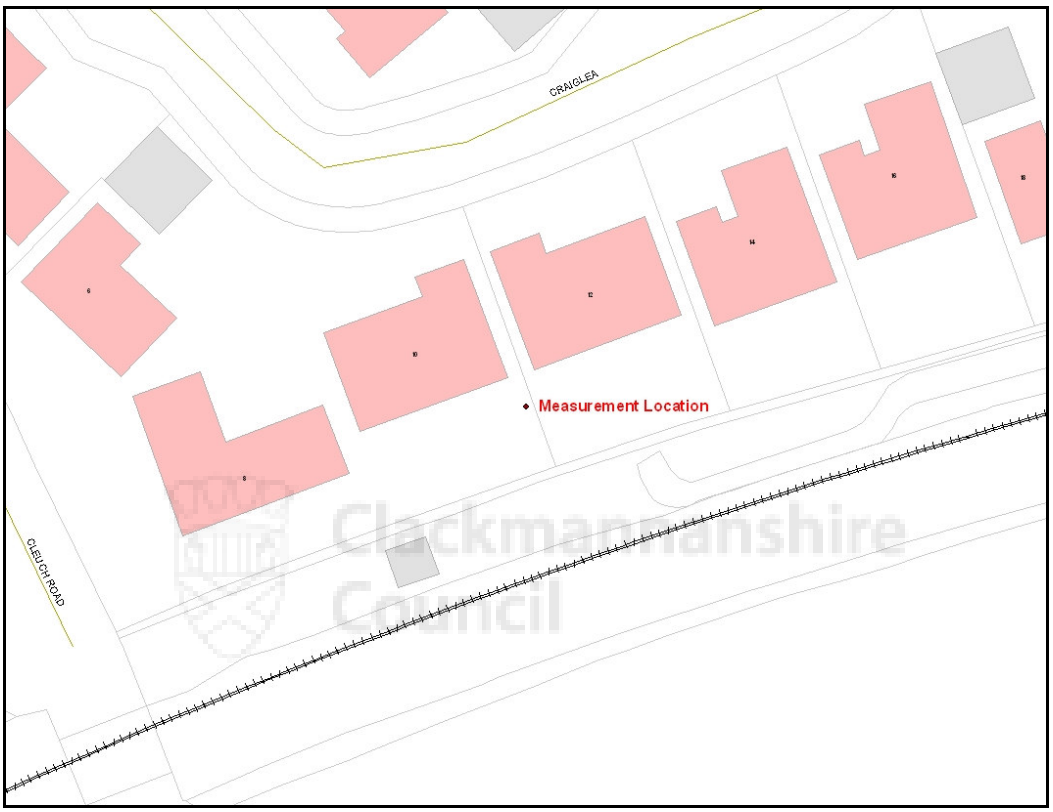
empty. It can be expected that 24 vibration events occur during a day and night-time period, with the fastest-moving eastbound trains normally responsible for the highest levels of vibration.

10 Craiglea, Causewayhead, Stirling

5.4 Continuously logged measurements were made from 14:32 on 24 November 2010 until 14:53 on 25 November 2010.

5.5 10 Craiglea is located in Causewayhead, Stirling. The Craiglea estate is located off the A9. Road vehicle use on Craiglea is mostly for the purpose of access to the estate. Cleuch Road, to the south-east of the measurement location, is also located off the A9 and similarly does not have a high volume of vehicles. The SAK railway line is located to the south of the properties on Craiglea, with the River Forth beyond this. It is likely that the SAK Railway line is the only significant source of vibration within the locale. Figure 5.2 illustrates the measurement location in relation to the surrounding area.

Figure 5.2: Plan of Measurement Location at 10 Craiglea, Causewayhead



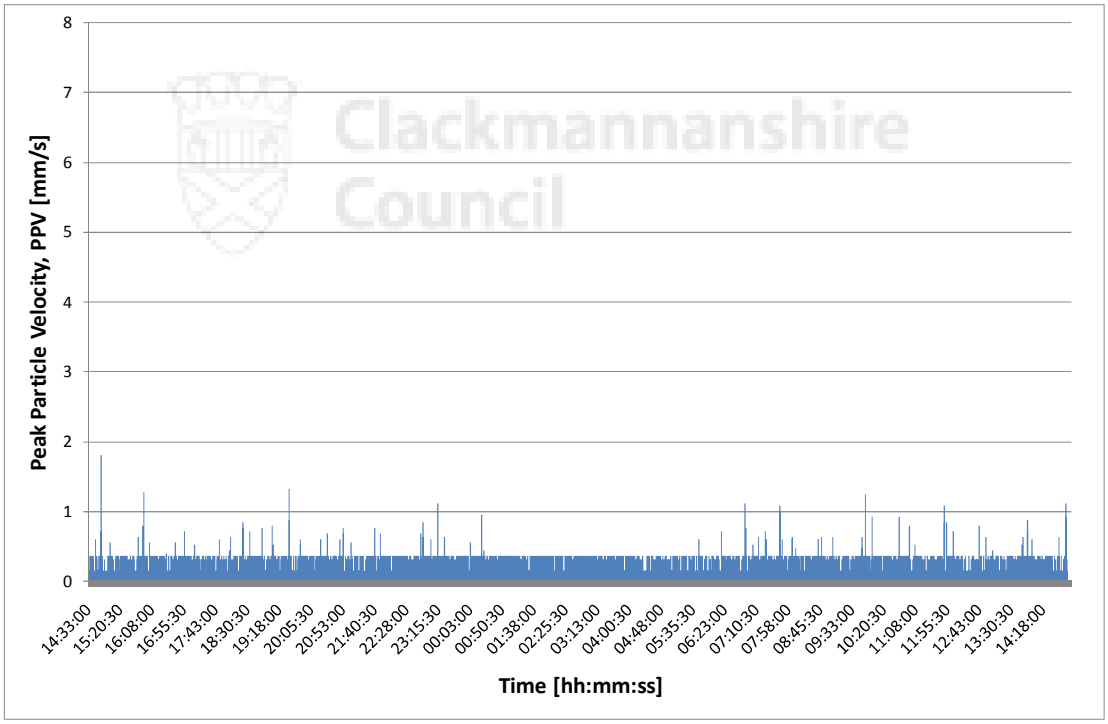
5.6 The measurement transducer was located approximately 12 m to the north of the nearside of the SAK Railway line and approximately 4 m to the south of the façade of 10 Craiglea. Figure 5.3 shows the equipment with the dwelling to the left.

Figure 5.3: Photograph of Vibration Monitoring Equipment at 10 Craiglea, Causewayhead

5.7 The weather conditions during the measurement period are believed to have been generally dry with very light winds. It is possible that there was a light ground frost at night.

5.8 Figure 5.4 shows the time history (in 30 second samples) of the measured PPVs. A series of peaks can be seen to rise above a very consistent background level. The latter is the aforementioned system noise floor. The tallest peaks are likely to correspond with freight trains. The peaks of lower level are likely to correspond with scheduled passenger services. It can be seen that there was no rail traffic during the night. Other sources of vibration, such as road traffic, are not significant.

Figure 5.4: Time History of 30-Second PPVs Measured at 10 Craiglea, Causewayhead



5.9 The highest measured PPV was 1.807 mm/s. This level occurred between 14:51:00 and 14:51:30 on Wednesday 24th November. It is likely to have resulted from the passage of a freight train.

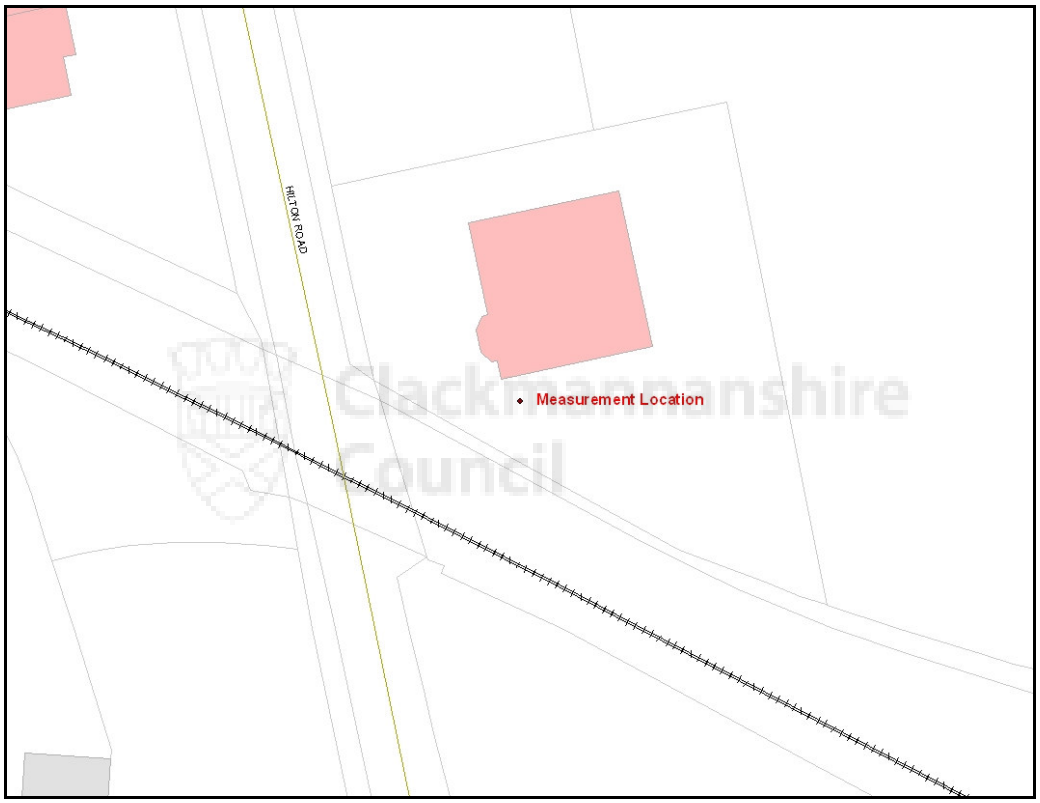
5.10 The measured PPVs are well below the criteria in BS 7385. This is even when it is assumed that dynamic magnification occurs, as described in 3.6. It is therefore unlikely that cosmetic structural damage to the dwelling might result (or might have resulted) from train pass-bys. The likelihood of more profound structural damage is very low. Any apparent structural damage, such as cosmetic cracks not previously reported in 2005, is unlikely to have resulted from rail vibration.

Colum-Cille, Hilton Road, Alloa, Clackmannanshire

5.11 Continuously logged measurements were made from 15:39 on 19 November 2010 until 10:44 on 22 November 2010.

5.12 Colum-Cille, Hilton Road is located in Alloa. Hilton Road, to the east of the measurement location, ends as it approaches the railway line. The SAK line is located to the south of Colum-Cille and is believed to be the only significant source of vibration within the locale. Figure 5.5 illustrates the measurement location in relation to the surrounding area of the property

Figure 5.5: Plan of Measurement Location at Colum-Cille, Hilton Road, Alloa



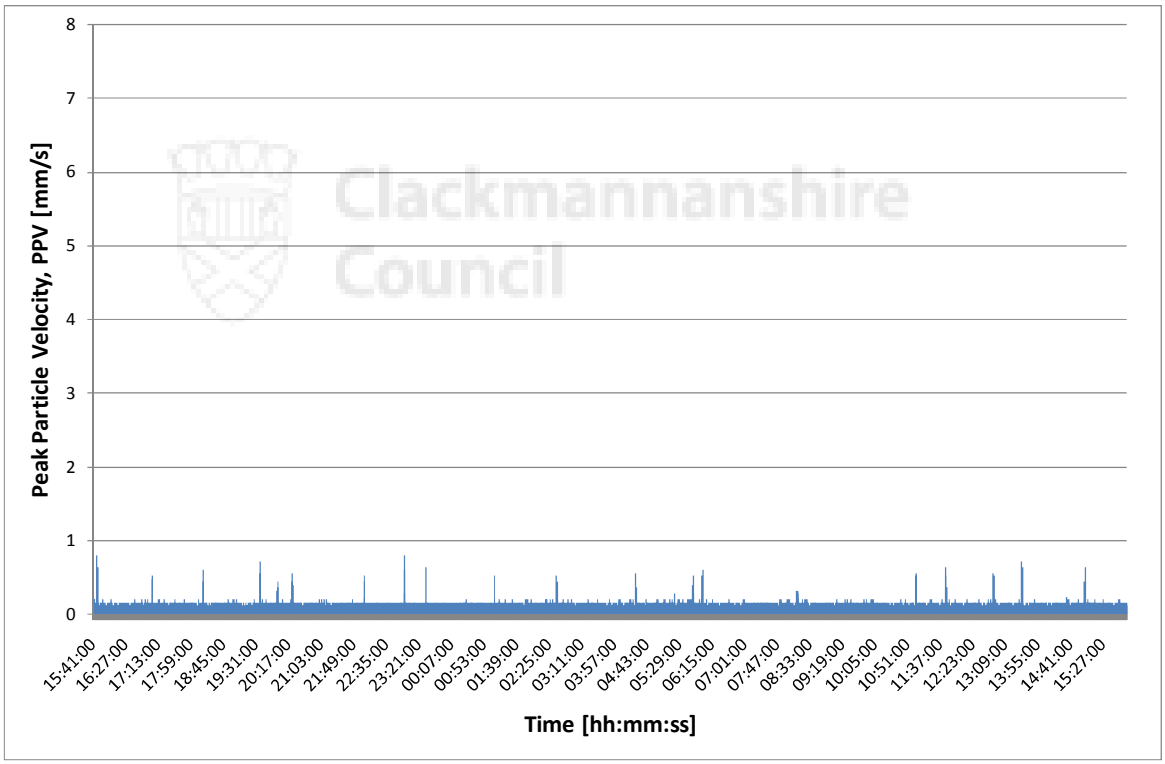
5.13 The measurement equipment was located approximately 11 m to the north of the nearside of the SAK railway line and approximately 3 m to the south of the facade of Colum-Cille, Hilton Road. Figure 5.6 illustrates.

Figure 5.6: Photograph of Vibration Monitoring Equipment at Colum-Cille, Hilton Road, Alloa

5.14 It is believed to have rained intermittently during the measurement period. Winds were relatively high on the Friday afternoon, but by Monday these had reduced to a fresh breeze.

5.15 Figure 5.7 shows the time history (in 30 second samples) of the measured PPVs**.** The peaks are likely to correspond with freight train pass-bys. Other sources of vibration, such as road traffic, are practically insignificant.

Figure 5.7: Time History of 30 second PPVs Measured at Colum-Cille, Hilton Road, Alloa



5.16 The highest measured PPV was 0.924 mm/s. This level occurred between 09:26:30 and 09:27:00 on Monday 22 November.

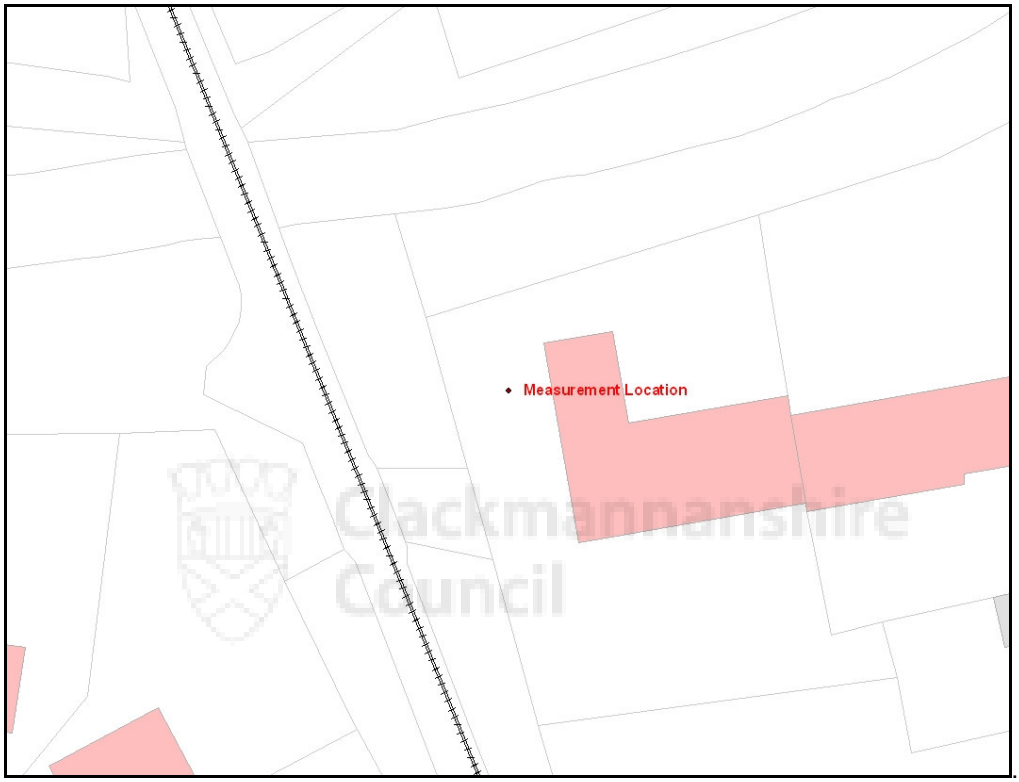
5.17 The measured PPVs are well below the criteria and are therefore unlikely to give rise to structural damage of any kind.

4 Mill Road, Clackmannan, Clackmannanshire

5.18 Continuously logged measurements were made from 13:44 on 24 November 2010 until 15:36 on 25 November 2010.

5.19 Adjacent to the property, the SAK rail line is located on an embankment, approximately 3.5 m above surrounding ground level. A short railway bridge spans Mill Road, which is not heavily trafficked. The railway and road are the only potential sources of vibration. Figure 5.8 below illustrates the measurement location in relation to the surrounding area.

Figure 5.8: Plan of Measurement Location at 4 Mill Road, Clackmannan



5.20 The measurement equipment was located approximately 14 m to the east of the nearside of the railway track and approximately 4 m to the west of the facade of 4 Mill Road. Figure 5.9 illustrates.