



# **Forth Replacement Crossing**

**Employer's Delivery Team  
Construction Vibration Monitoring Report**

**M9 Junction 1a Contract  
(November 2012)**



An agency of  The Scottish Government



**FORTH REPLACEMENT CROSSING**

**EMPLOYER'S DELIVERY TEAM  
CONSTRUCTION VIBRATION MONITORING REPORT**

**M9 JUNCTION 1A CONTRACT  
(November 2012)**

**Revision Status**

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**APPENDIX A – M9 J1A CONTRACT CONSTRUCTION VIBRATION CHARTS**

## **1. INTRODUCTION**

1.1 This report sets out the results of the construction vibration monitoring undertaken on the M9 Junction 1a Contract in November 2012 as part of the Forth Replacement Crossing project.

## 2. M9 J1A CONTRACT VIBRATION MONITORING

### VIBRATION MONITORING LOCATIONS

2.1 Continuous vibration monitoring was carried out at fixed monitor locations in November 2012 as outlined in Table 2.1 below. The main construction activities carried out adjacent to the monitor locations are also listed.

Monitoring Location	Monitoring Period	Main Construction Activities
93/95 King Edwards Way (CNV02)	November 2012	<ul style="list-style-type: none"> <li>• Pavement works on eastbound merge slip</li> <li>• Roadmarking works on eastbound merge slip</li> <li>• Niddry Burn mammal ledge</li> </ul>
15-17 Buie Rigg (CNV07)	November 2012	<ul style="list-style-type: none"> <li>• Pavement works on eastbound merge slip &amp; southbound M9 Spur</li> <li>• Pavement works on eastbound merge slip &amp; southbound M9 Spur</li> <li>• Erection of traffic signs on eastbound merge slip</li> </ul>
8 Kirklands Park Grove (CNV16)	November 2012	<ul style="list-style-type: none"> <li>• Pavement works on eastbound merge slip &amp; southbound M9 Spur</li> <li>• Pavement works on eastbound merge slip &amp; southbound M9 Spur</li> <li>• Pavement works on eastbound merge slip &amp; southbound M9 Spur</li> <li>• Pavement works continued on eastbound merge slip &amp; southbound M9 Spur</li> </ul>

**Table 2.1 Long Term Monitoring Locations – November**

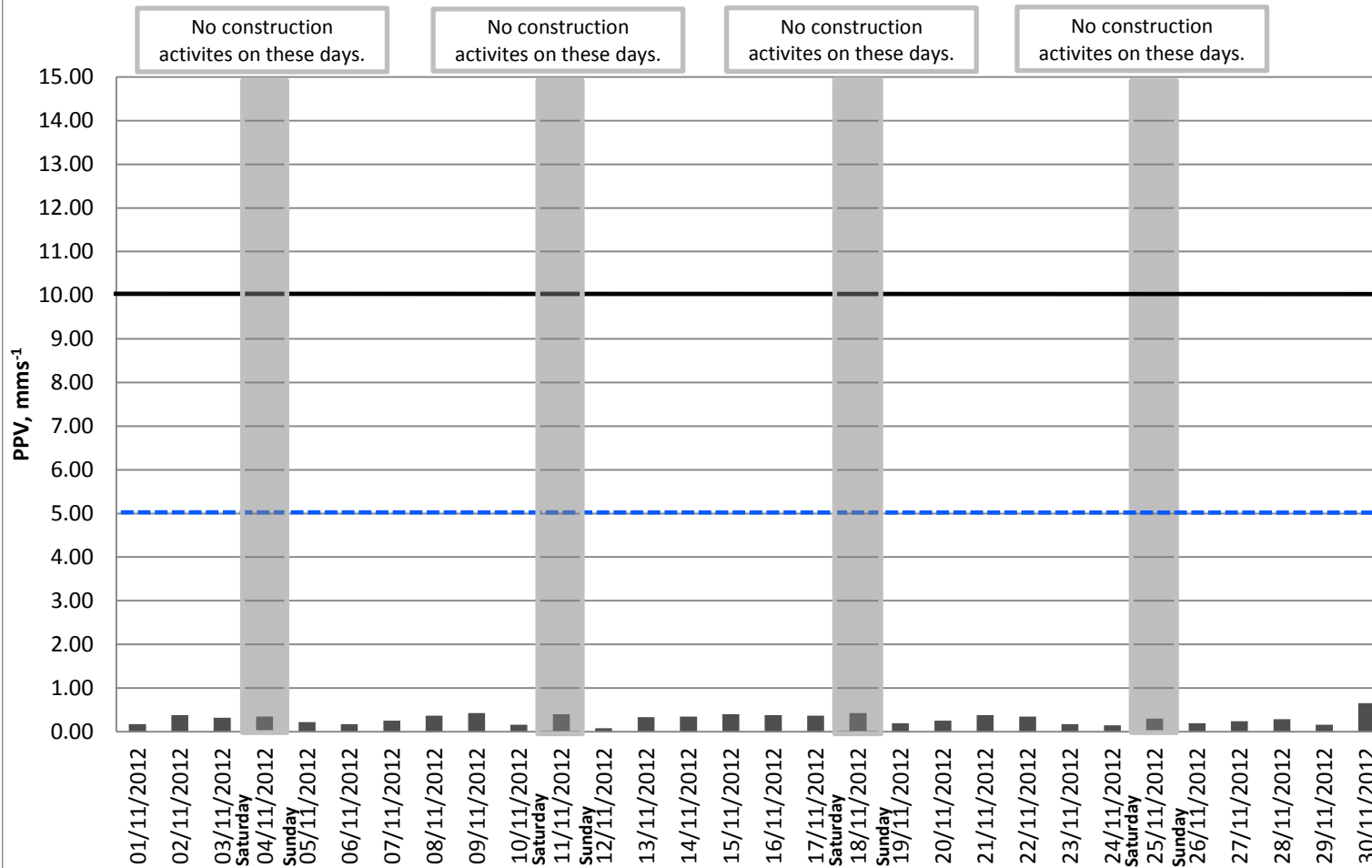
### VIBRATION MONITORING RESULTS

2.2 The results of the M9 J1a Contract construction vibration monitoring are provided in chart format in Appendix A of this report.

2.3 The charts show the Vibration Dose Values (VDV) and Peak Particle Velocities (PPV) recorded at receptors. VDV levels are recorded in order to monitor the potential for disturbance to the occupants of buildings (as discussed in BS 6472) and PPV values are recorded in order to monitor the potential for damage to buildings (as discussed in BS 7385).

- 2.4 The charts indicate that all construction activities in the period were carried out in accordance with the vibration thresholds set out in the project Code of Construction Practice.
- 2.5 No exceedances of the VDV threshold level were recorded in the month of November.
- 2.6 No exceedances of the PPV threshold level were recorded in the month of November.

## Measured highest daytime Peak Particle Velocity (PPV), 93/95 King Edwards Way (CNV02) Measurement period 1st November 2012 to 30th November 2012



**Construction PPV Thresholds**

— Daily PPV threshold for intermittent construction

- - - Daily PPV threshold for continuous construction

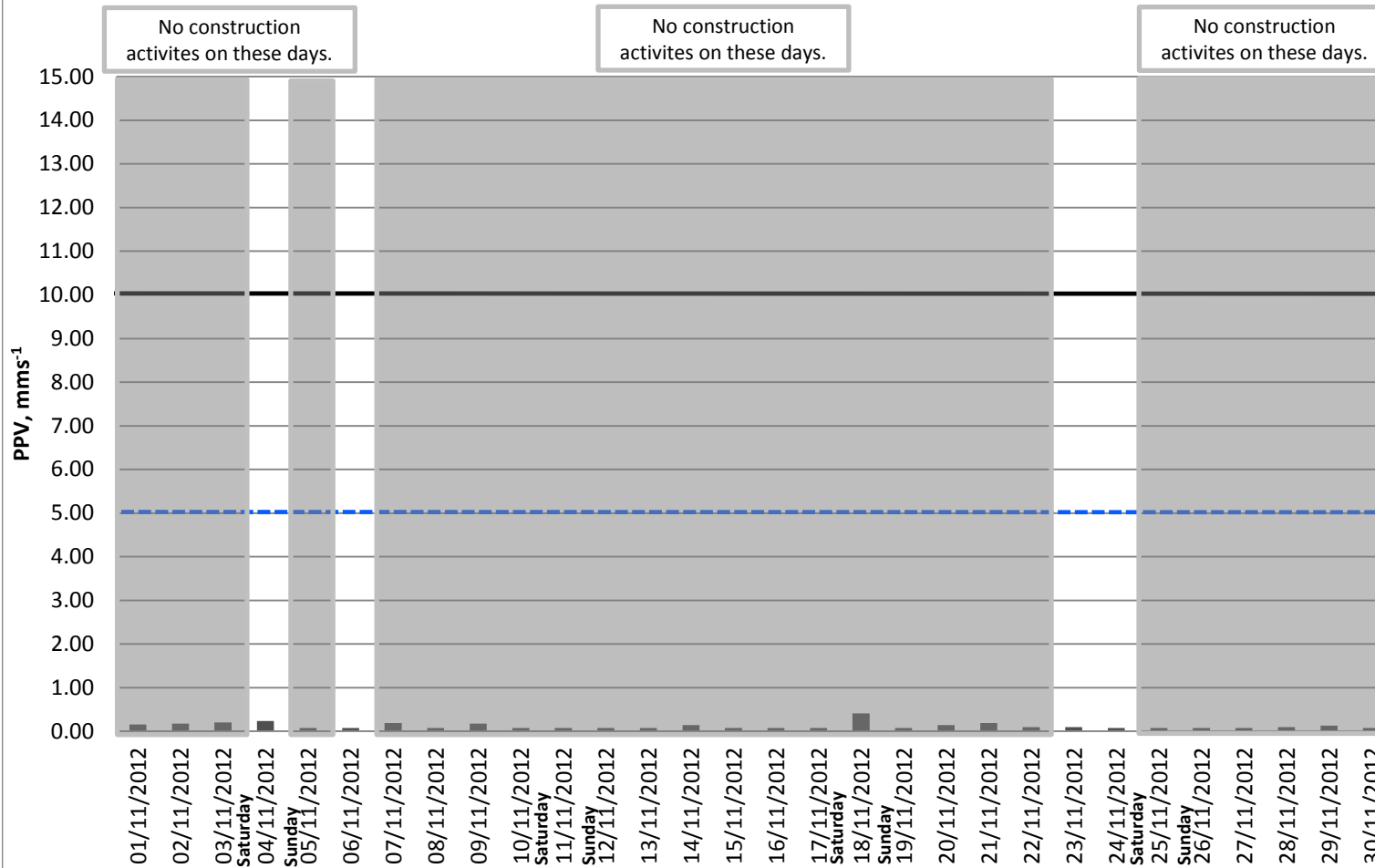
**Measured VDV**

■ Daily highest PPV (z-axis)

(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.

## Measured highest night-time Peak Particle Velocity (PPV), 93/95 King Edwards Way (CNV02) Measurement period 1st November 2012 to 30th November 2012



**Construction PPV Thresholds**

- Daily PPV threshold for intermittent construction (solid black line)
- Daily PPV threshold for continuous construction (dashed blue line)

**Measured VDV**

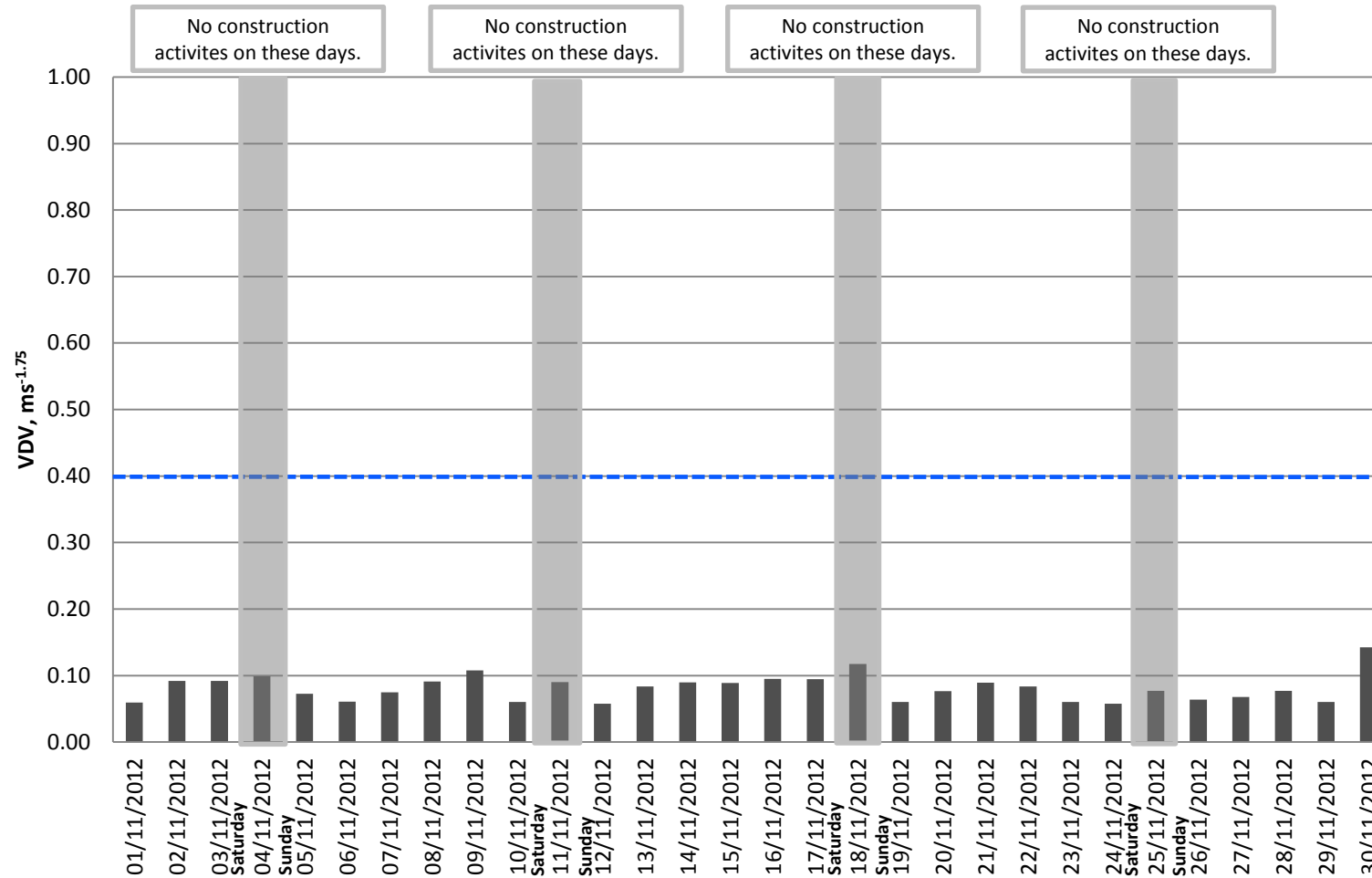
- Daily highest PPV (z-axis) (grey bar)
- (n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.





## Measured daytime (07:00-23:00) Vibration Dose Values (VDV), 93/95 King Edwards Way (CNV02) Measurement period 1st November 2012 to 30th November 2012



**Construction VDV Threshold**

Daily daytime VDV threshold for residential dwellings

**Measured VDV**

■ Daily daytime VDV (z-axis)

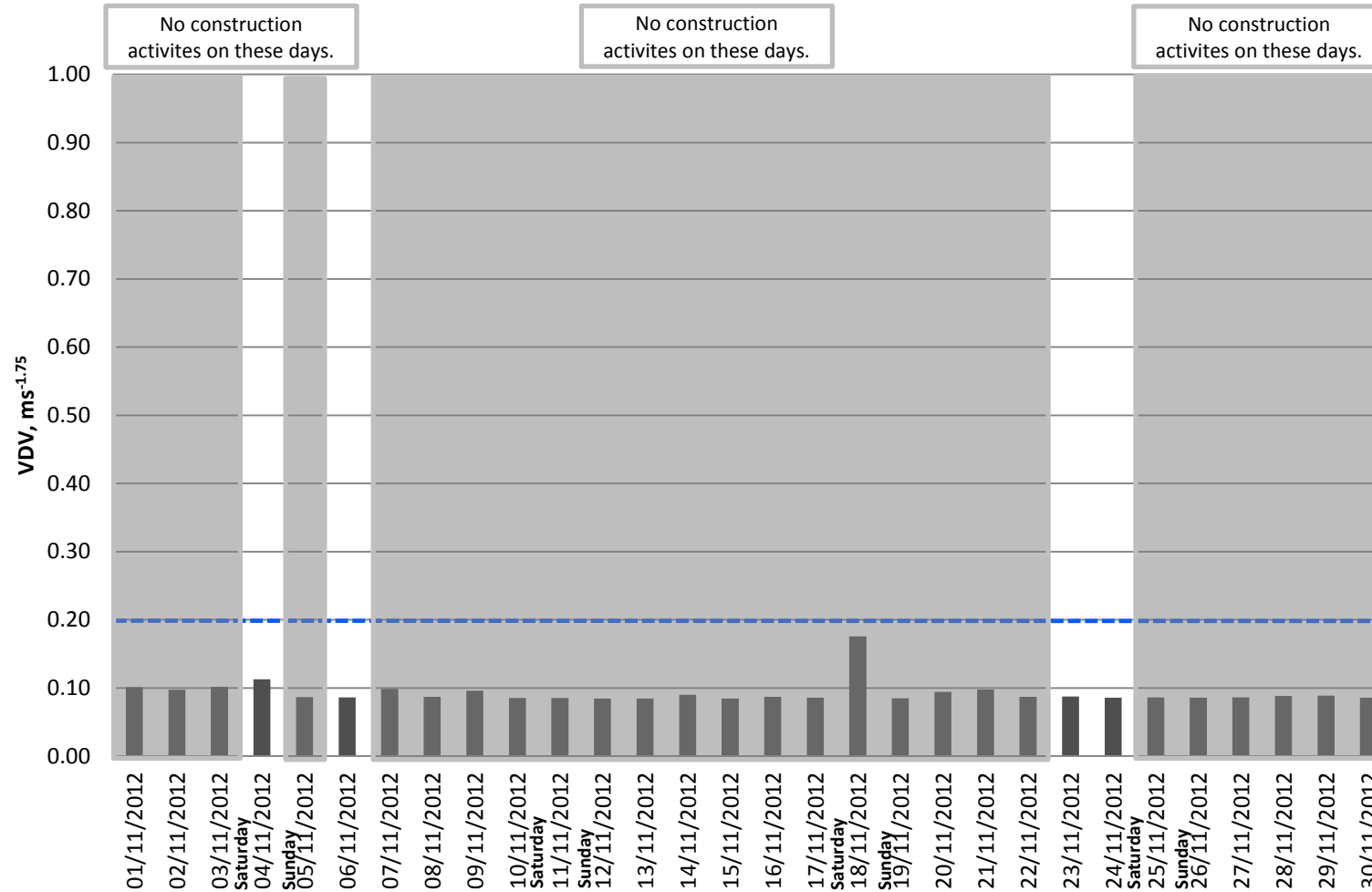
(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.

VDV threshold for Education establishments, offices and similar is  $0.40\text{ms}^{-1.75}$  and Commercial is  $0.80\text{ms}^{-1.75}$ . Therefore it may be necessary to adjust the threshold displayed on the graph if buildings other than residential dwellings are being assessed.

## Measured night time (23:00-07:00) Vibration Dose Values (VDV), 93/95 King Edwards Way (CNV02)

Measurement period 1st November 2012 to 30th November 2012



**Construction VDV Threshold**

Daily night time VDV threshold for residential dwellings

**Measured VDV**

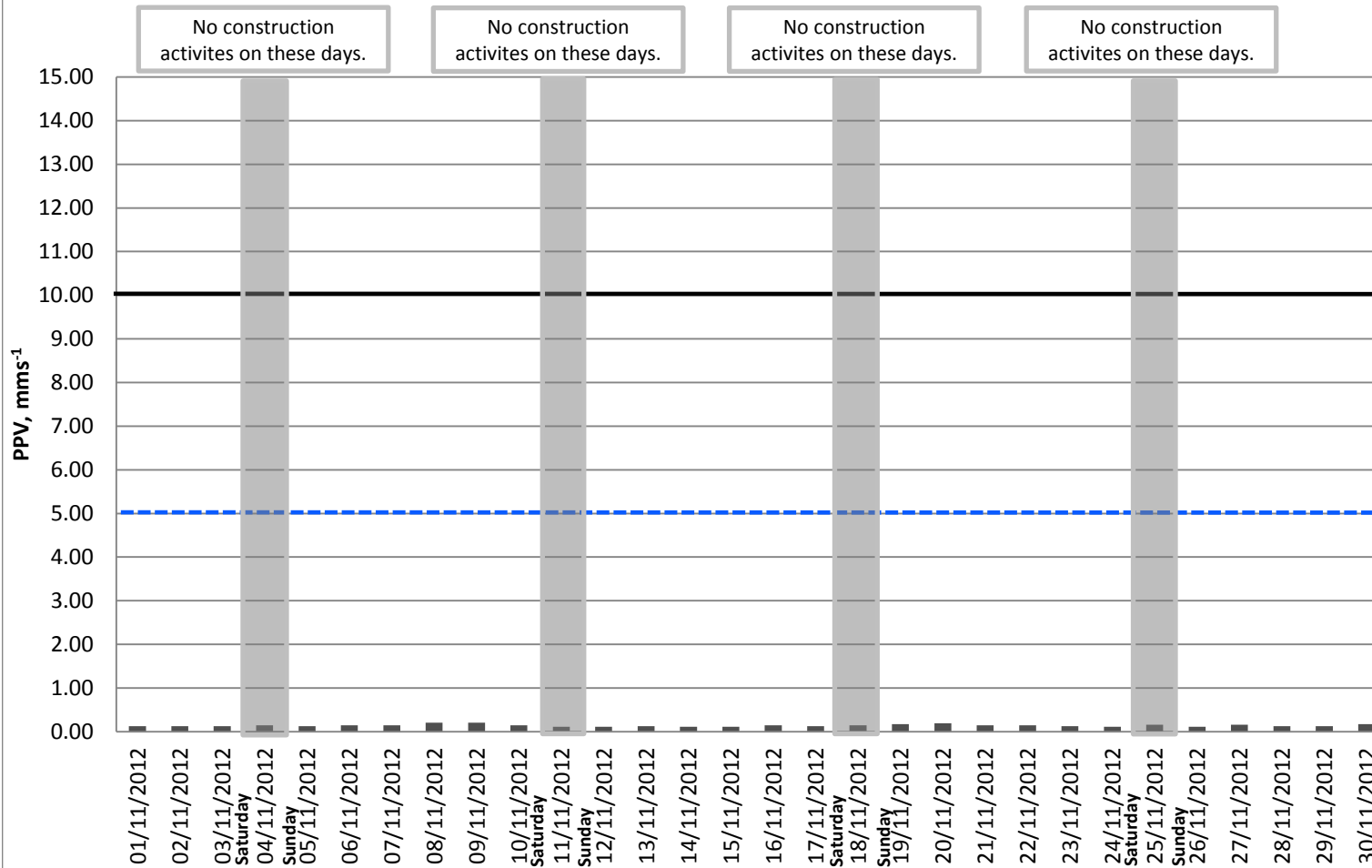
■ Daily night time VDV (z-axis)

(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.

A transfer function equivalent to doubling the night-time VDV measurements has been applied to obtain values representative of an upstairs, mid-floor receptor location. VDV threshold for Education establishments, offices and similar is 0.40ms<sup>-1.75</sup> and Commercial is 0.80ms<sup>-1.75</sup>. Therefore it may be necessary to adjust the threshold displayed on the graph if buildings other than residential dwellings are being assessed.

## Measured highest daytime Peak Particle Velocity (PPV), 15-17 Buie Rigg (CNV07) Measurement period 1st November 2012 to 30th November 2012



**Construction PPV Thresholds**

— Daily PPV threshold for intermittent construction

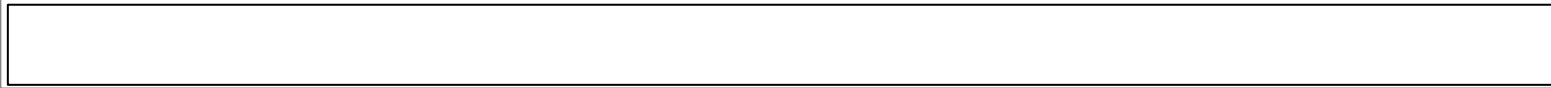
- - - Daily PPV threshold for continuous construction

**Measured VDV**

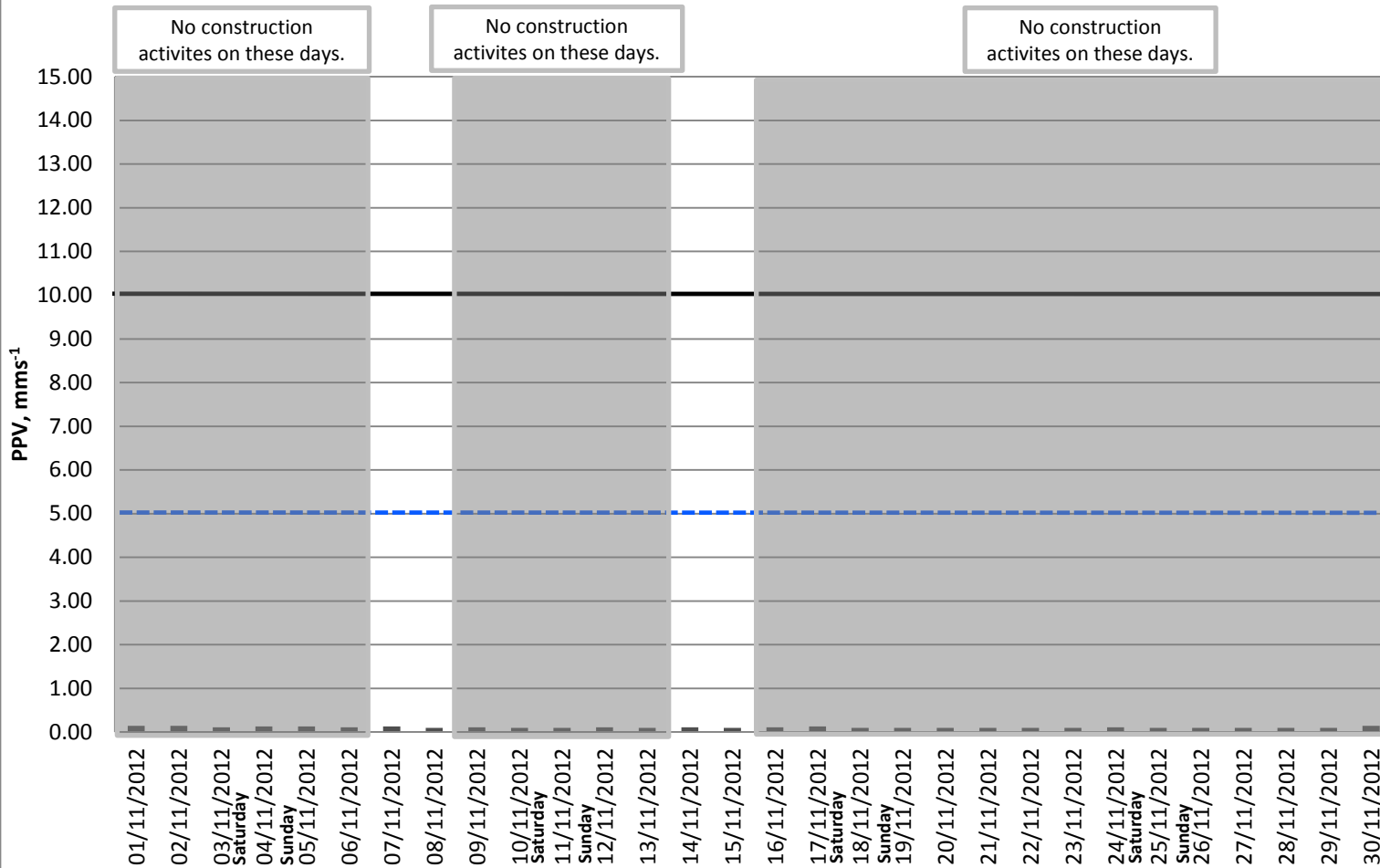
■ Daily highest PPV (z-axis)

(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.



## Measured highest night-time Peak Particle Velocity (PPV), 15-17 Buie Rigg (CNV07) Measurement period 1st November 2012 to 30th November 2012



**Construction PPV Thresholds**

— Daily PPV threshold for intermittent construction

- - - Daily PPV threshold for continuous construction

**Measured VDV**

■ Daily highest PPV (z-axis)

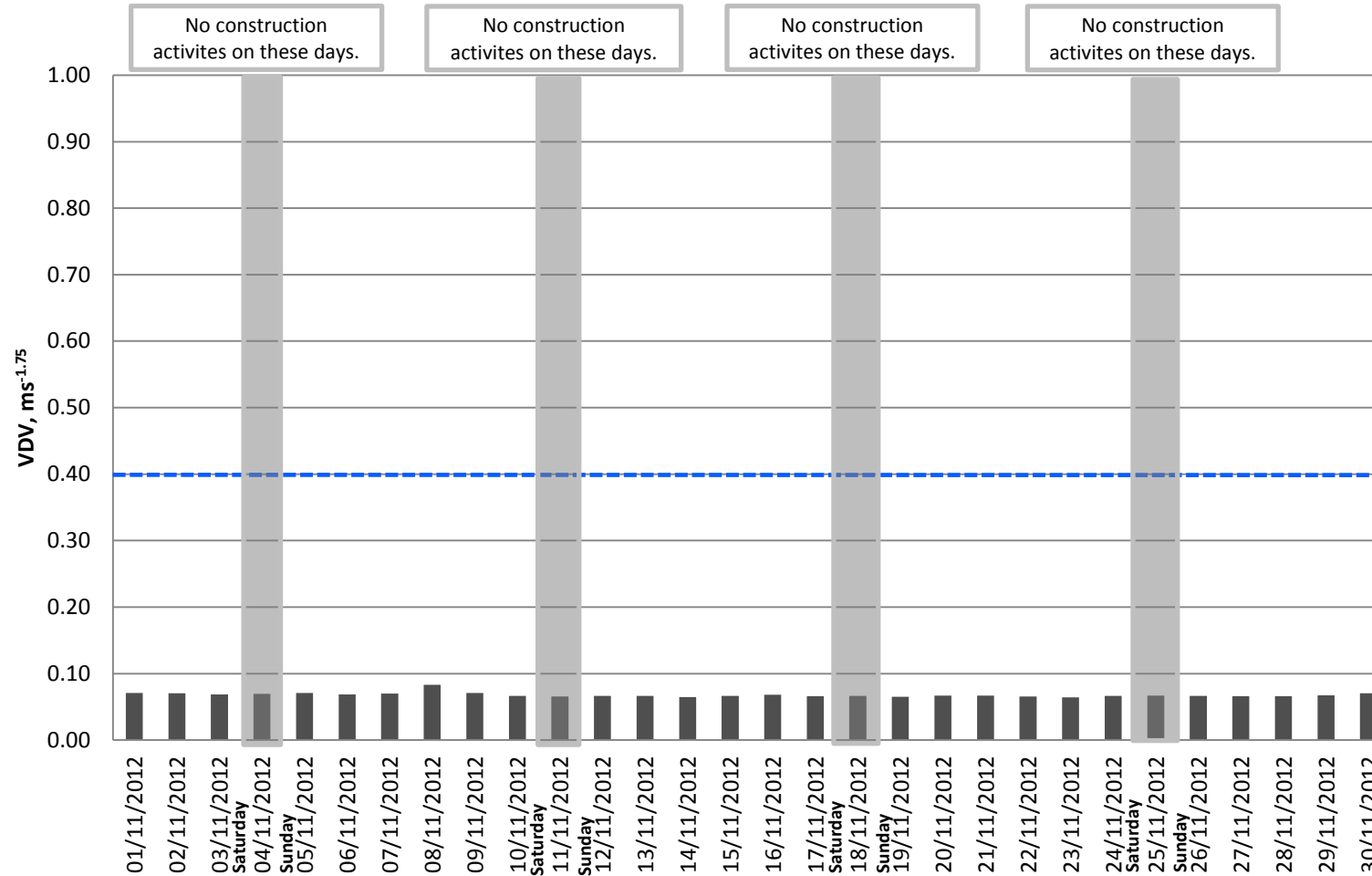
(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.



## Measured daytime (07:00-23:00) Vibration Dose Values (VDV), 15-17 Buie Rigg (CNV07)

Measurement period 1st November 2012 to 30th November 2012



**Construction VDV Threshold**

Daily daytime VDV threshold for residential dwellings

**Measured VDV**

■ Daily daytime VDV (z-axis)

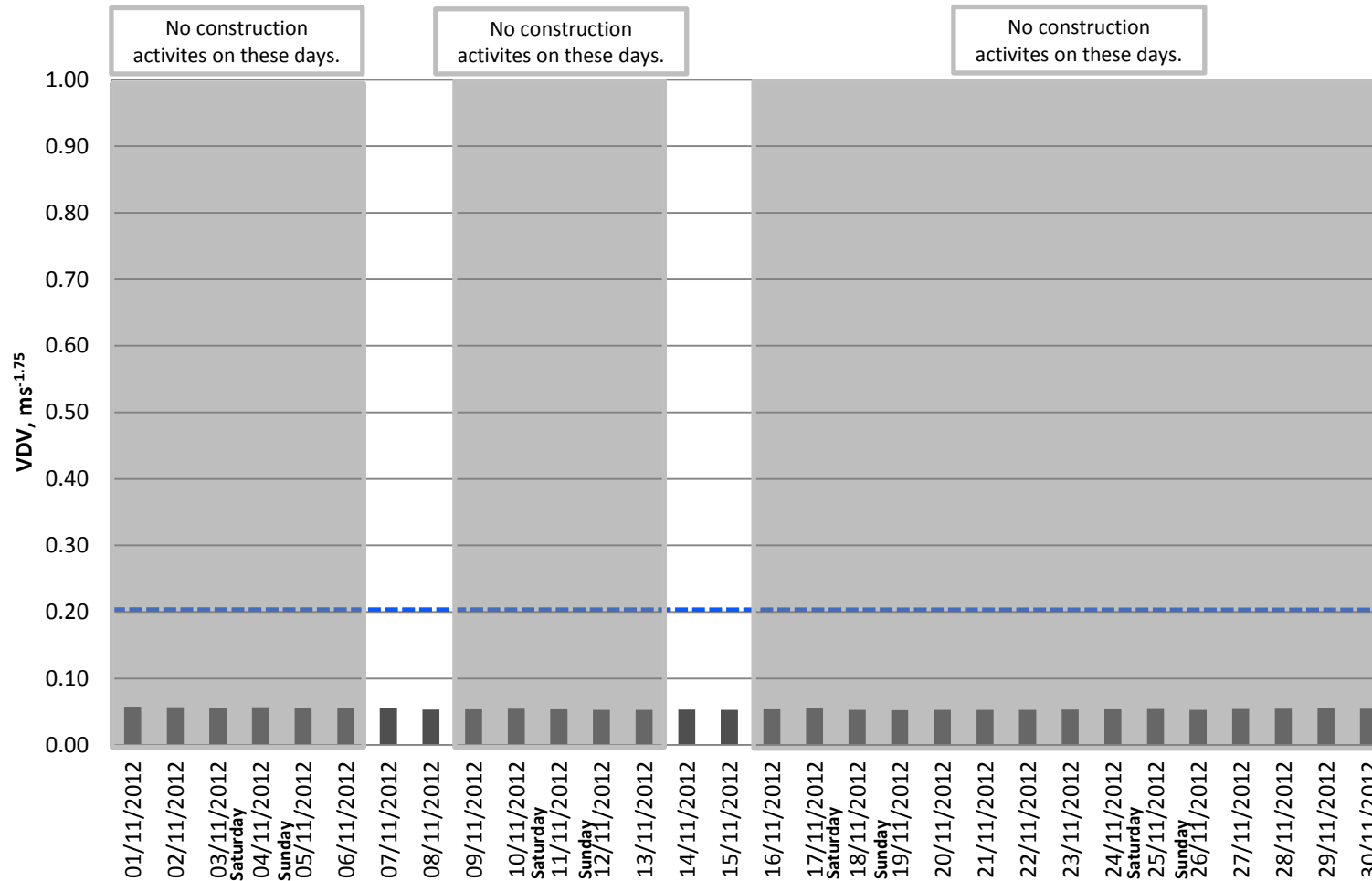
(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.

VDV threshold for Education establishments, offices and similar is  $0.40\text{ms}^{-1.75}$  and Commercial is  $0.80\text{ms}^{-1.75}$ . Therefore it may be necessary to adjust the threshold displayed on the graph if buildings other than residential dwellings are being assessed.

## Measured night time (23:00-07:00) Vibration Dose Values (VDV), 15-17 Buie Rigg (CNV07)

Measurement period 1st November 2012 to 30th November 2012



**Construction VDV Threshold**

Daily night time VDV threshold for residential dwellings

**Measured VDV**

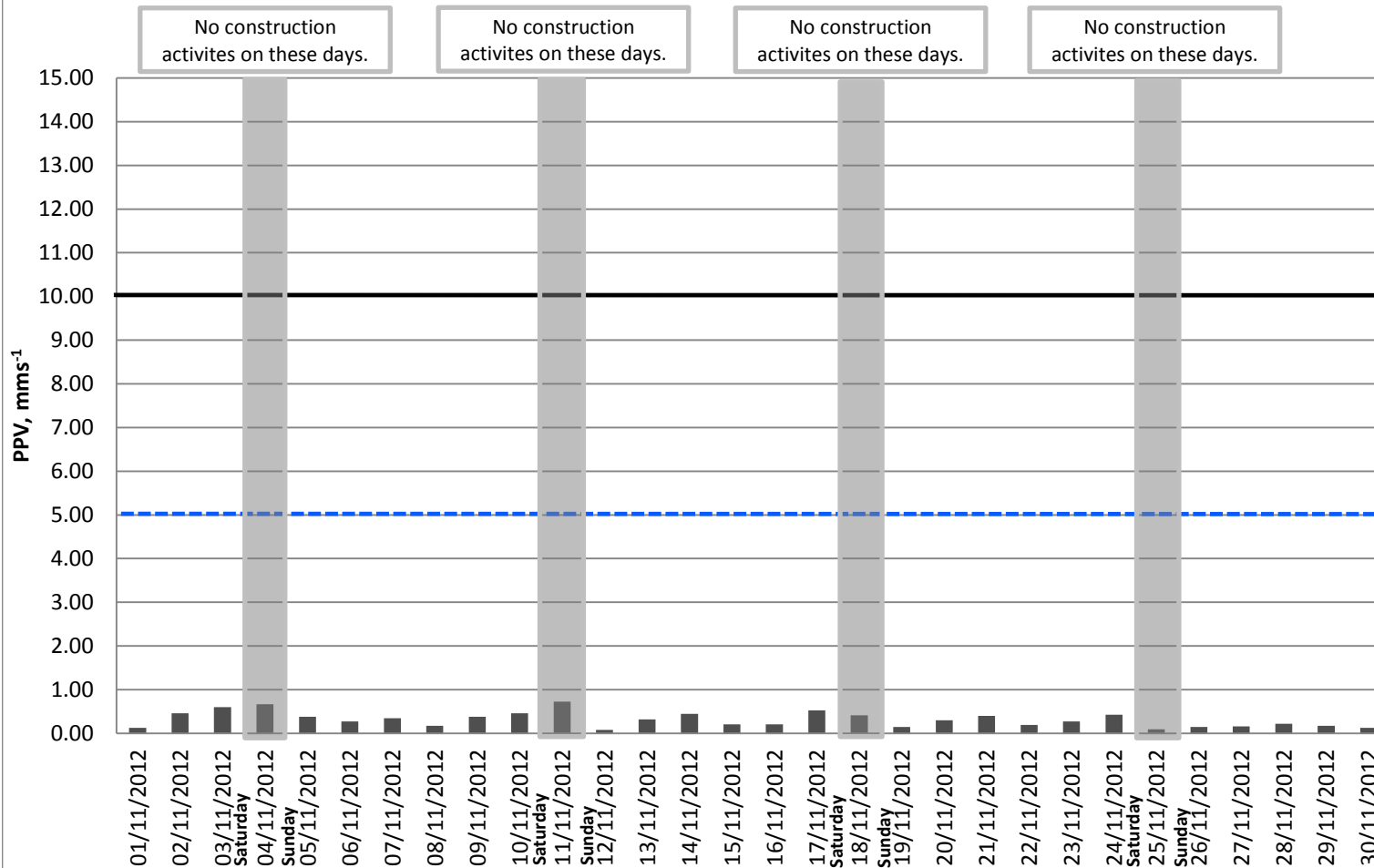
■ Daily night time VDV (z-axis)

(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.

VDV threshold for Education establishments, offices and similar is  $0.40ms^{-1.75}$  and Commercial is  $0.80ms^{-1.75}$ . Therefore it may be necessary to adjust the threshold displayed on the graph if buildings other than residential dwellings are being assessed.

## Measured highest daytime Peak Particle Velocity (PPV), 8 Kirklands Park Grove (CNV16) Measurement period 1st November 2012 to 30th November 2012



**Construction PPV Thresholds**

— Daily PPV threshold for intermittent construction

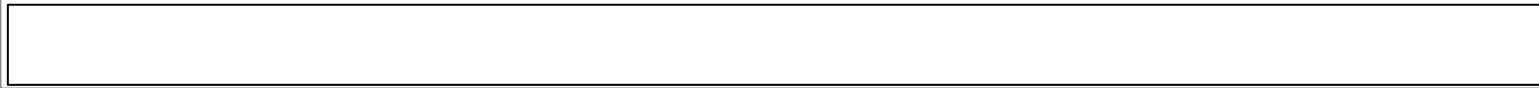
- - - Daily PPV threshold for continuous construction

**Measured VDV**

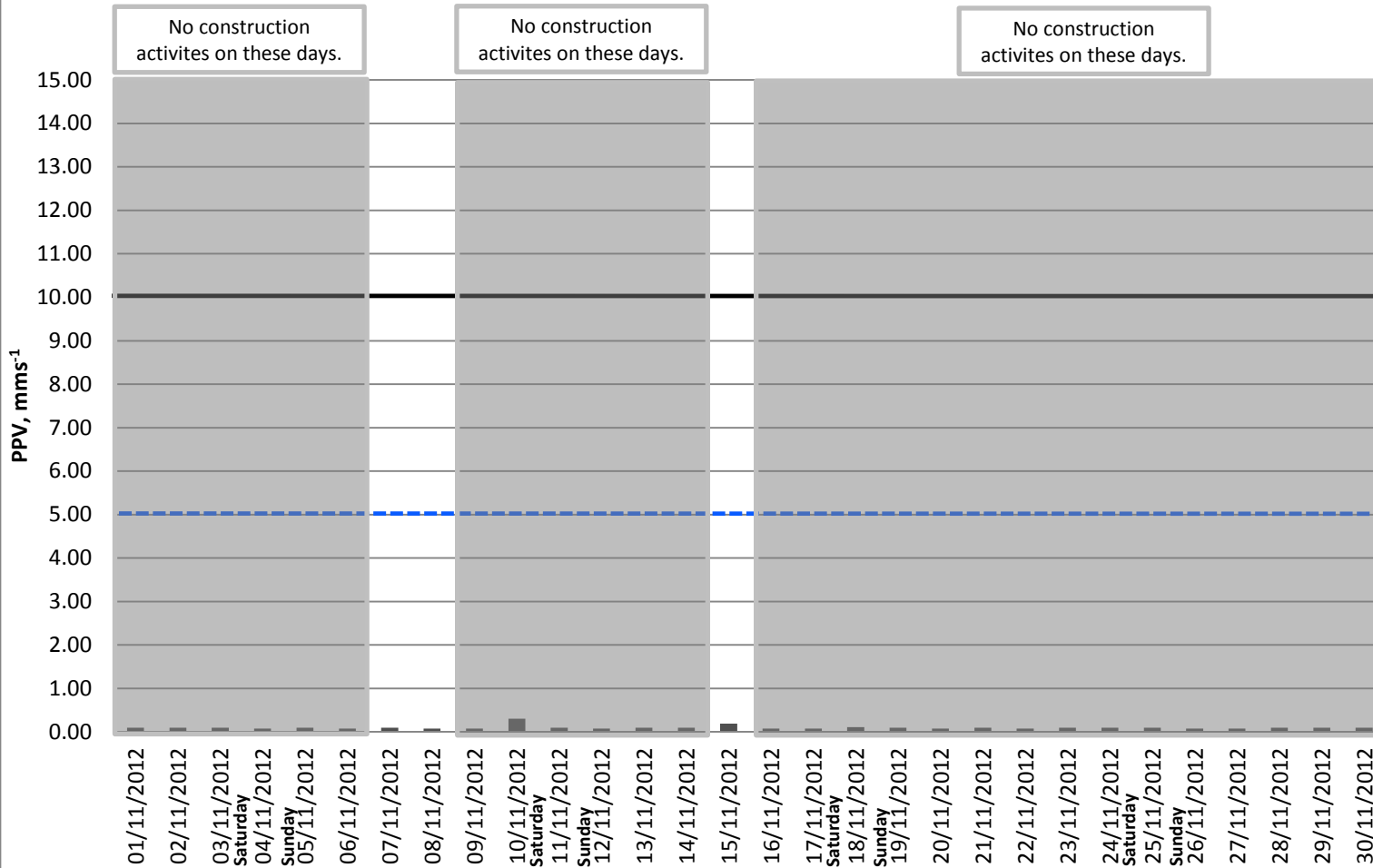
■ Daily highest PPV (z-axis)

(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.



## Measured highest night-time Peak Particle Velocity (PPV), 8 Kirklands Park Grove (CNV16) Measurement period 1st November 2012 to 30th November 2012



**Construction PPV Thresholds**

- Daily PPV threshold for intermittent construction
- - - Daily PPV threshold for continuous construction

**Measured VDV**

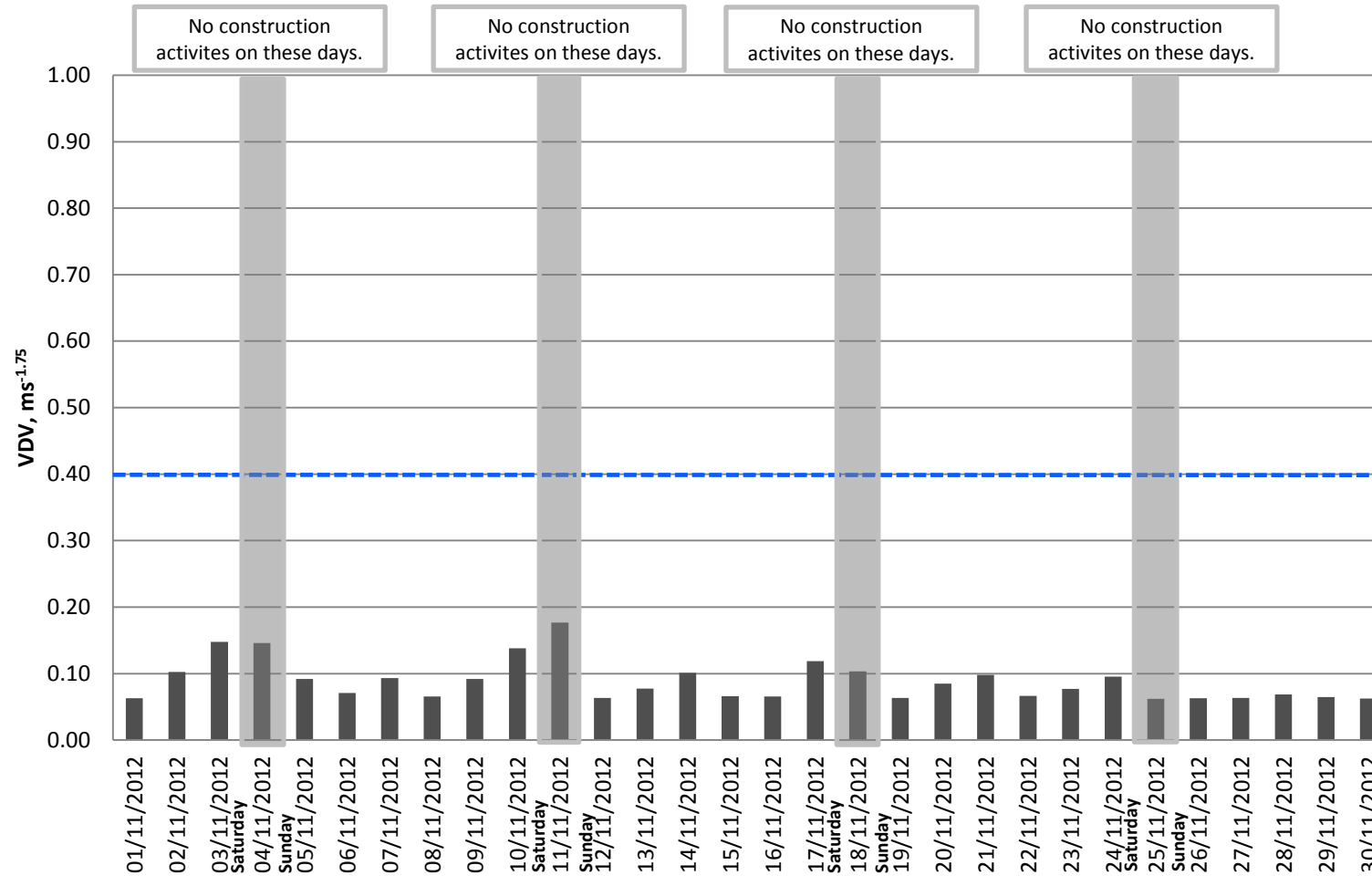
- Daily highest PPV (z-axis)
- (n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.





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**Construction VDV Threshold**

Daily daytime VDV threshold for residential dwellings

**Measured VDV**

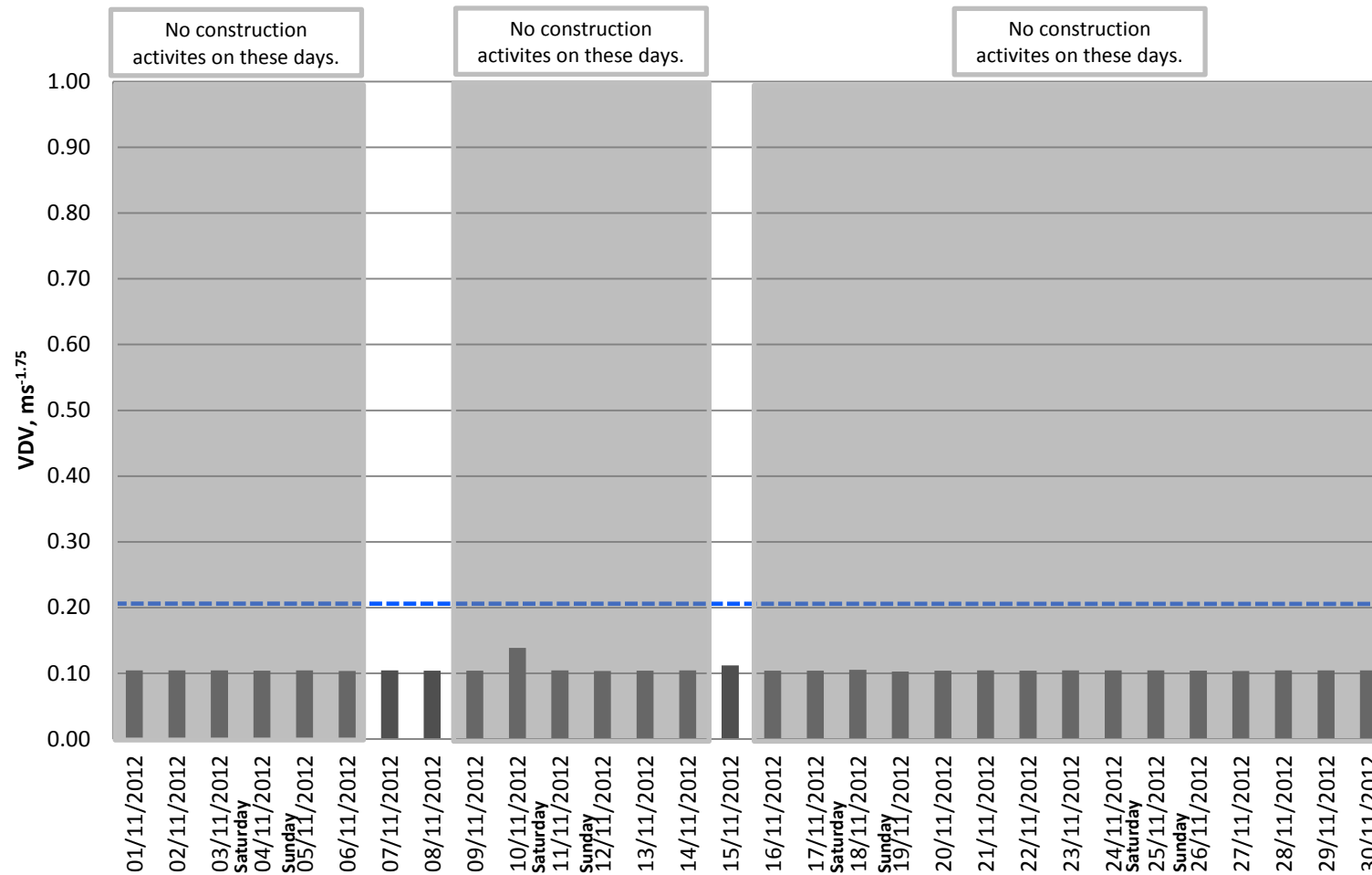
■ Daily daytime VDV (z-axis)

(n) = Investigation Report Number

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**Construction VDV Threshold**

Daily night time VDV threshold for residential dwellings

**Measured VDV**

■ Daily night time VDV (z-axis)

(n) = Investigation Report Number

**Note:** The horizontal axes often show high vibration levels caused by spurious 'localised' events which are not attributable to construction works, whilst the vertical axis appears much less affected. Therefore the results from only the vertical dataset are presented, as a more reliable indicator of the prevailing vibration climate at this location.

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