



Forth Replacement Crossing

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

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



An agency of  The Scottish Government



FORTH REPLACEMENT CROSSING

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

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

Revision Status

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FORTH REPLACEMENT CROSSING

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

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1. INTRODUCTION

1.1 This report sets out the results of the construction vibration monitoring undertaken on the M9 Junction 1a Contract in December 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 December 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)	December 2012	<ul style="list-style-type: none">• Pavement works complete• ITS hardstanding and footpath at G03J• Niddry Burn mammal ledge installed• Fencing works
15-17 Buie Rigg (CNV07)	December 2012	<ul style="list-style-type: none">• Pavement works complete• Newmains Bridge verge & expansion joints• Snagging works at Newmains Bridge• Snagging works at M9 Overbridge• Landscaping works
8 Kirklands Park Grove (CNV16)	December 2012	<ul style="list-style-type: none">• Pavement works complete• Snagging works at Newmains Bridge• Snagging works at M9 Overbridge

Table 2.1 Long Term Monitoring Locations – December

VIBRATION MONITORING RESULTS

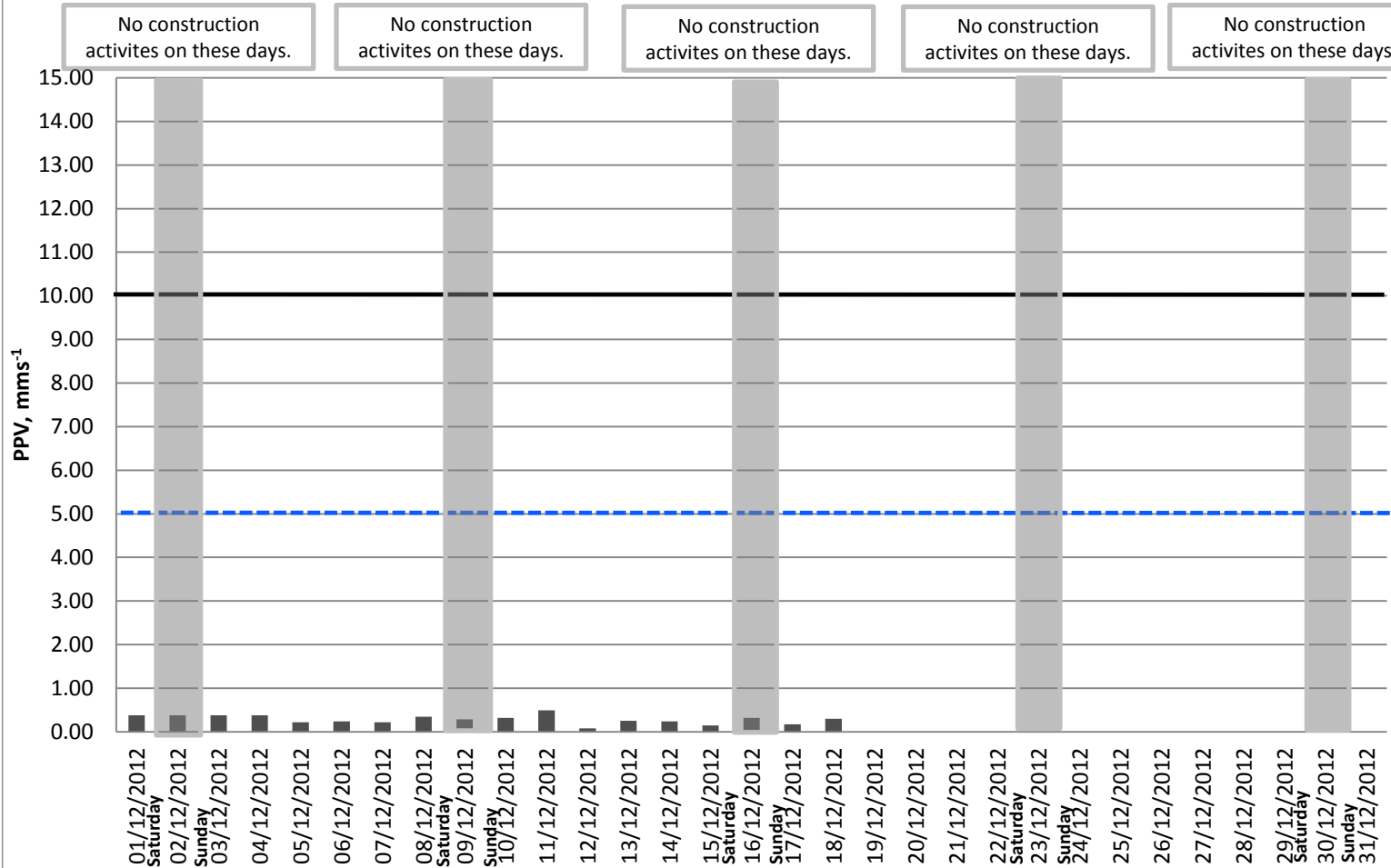
2.2 The results of the M9 J1a Contract construction vibration monitoring are provided in chart format in Appendix A of this report.

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 Three exceedances of the VDV threshold were recorded at King Edwards Way on 01/12/12, 02/12/12 and 03/12/12. However, these exceedances occurred during the night when no activities were being carried out on site and are therefore not attributed to construction works.
- 2.6 No exceedances of the PPV threshold level were recorded in the month of December.

Measured highest daytime Peak Particle Velocity (PPV), 93/95 King Edwards Way (CNV02) Measurement period 1st December 2012 to 31st December 2012



Construction PPV Thresholds

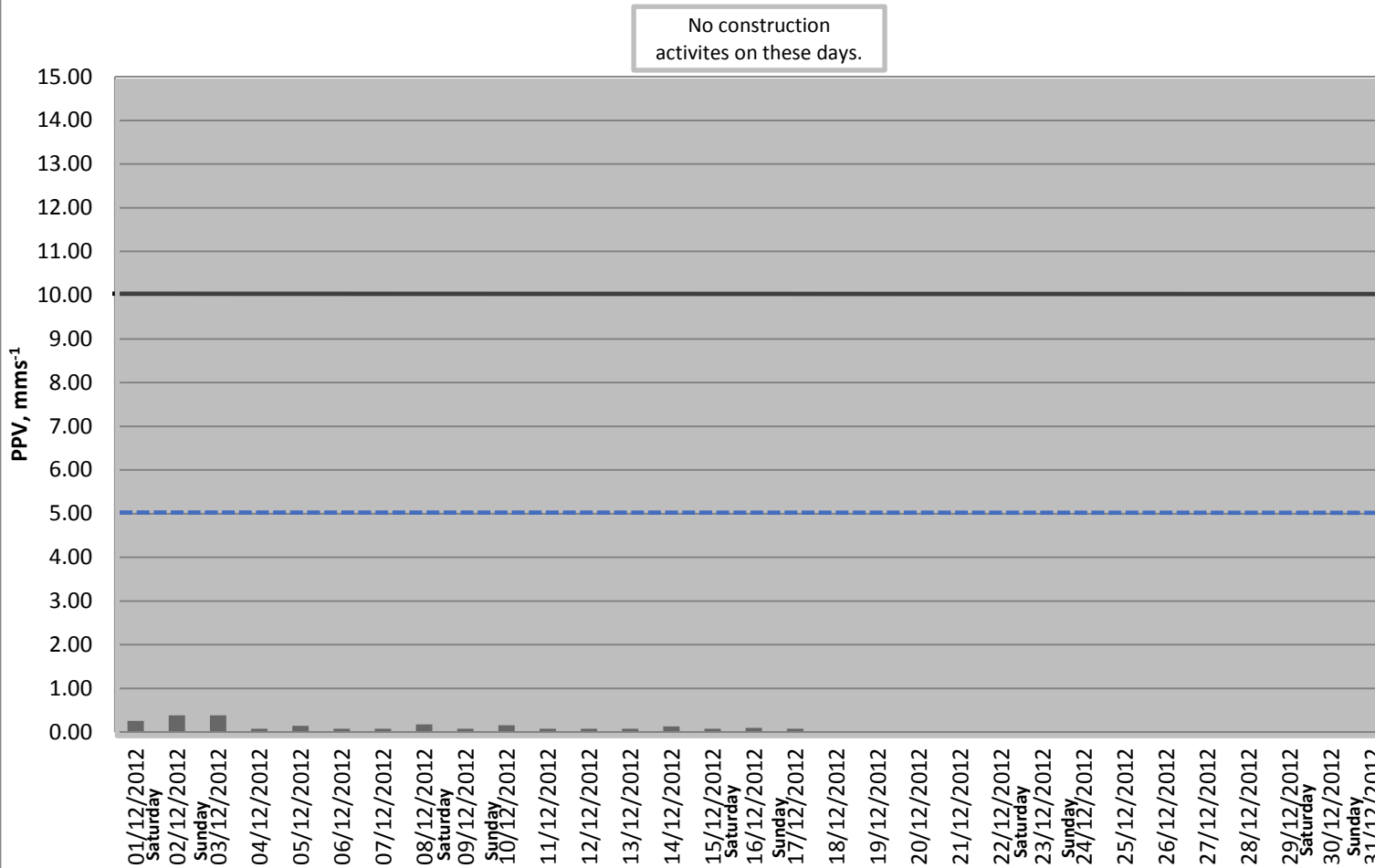
- Daily PPV threshold for intermittent construction
- - - Daily PPV threshold for continuous construction

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 December 2012 to 31st December 2012



Construction PPV Thresholds

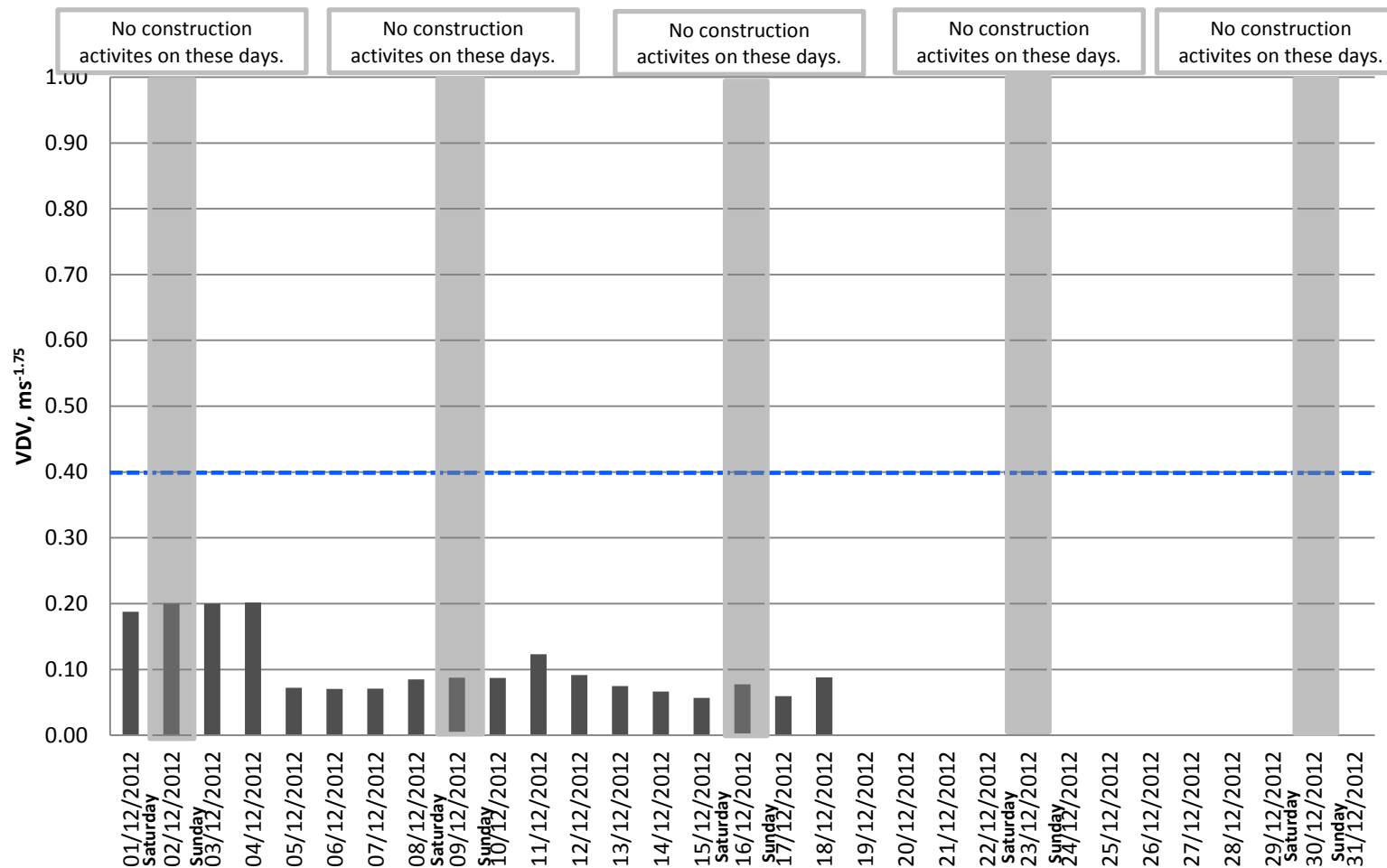
- Daily PPV threshold for intermittent construction
- - - Daily PPV threshold for continuous construction

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), 93/95 King Edwards Way (CNV02) Measurement period 1st December 2012 to 31st December 2012



Construction VDV Threshold

Daily daytime VDV threshold for residential dwellings

Measured VDV

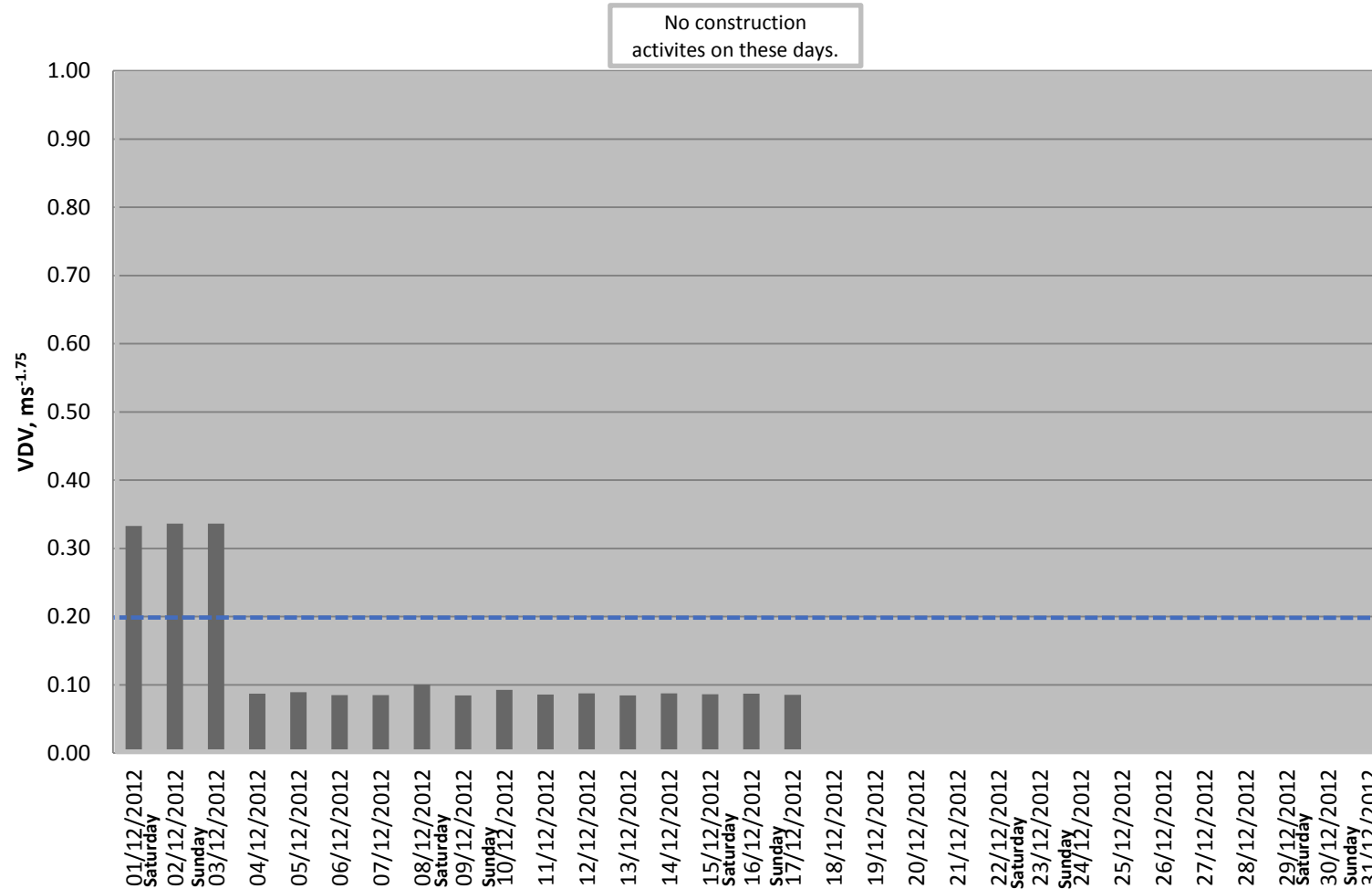
■ Daily daytime VDV (z-axis)

(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 December 2012 to 31st December 2012



Construction VDV Threshold

Daily night time VDV threshold for residential dwellings

Measured VDV

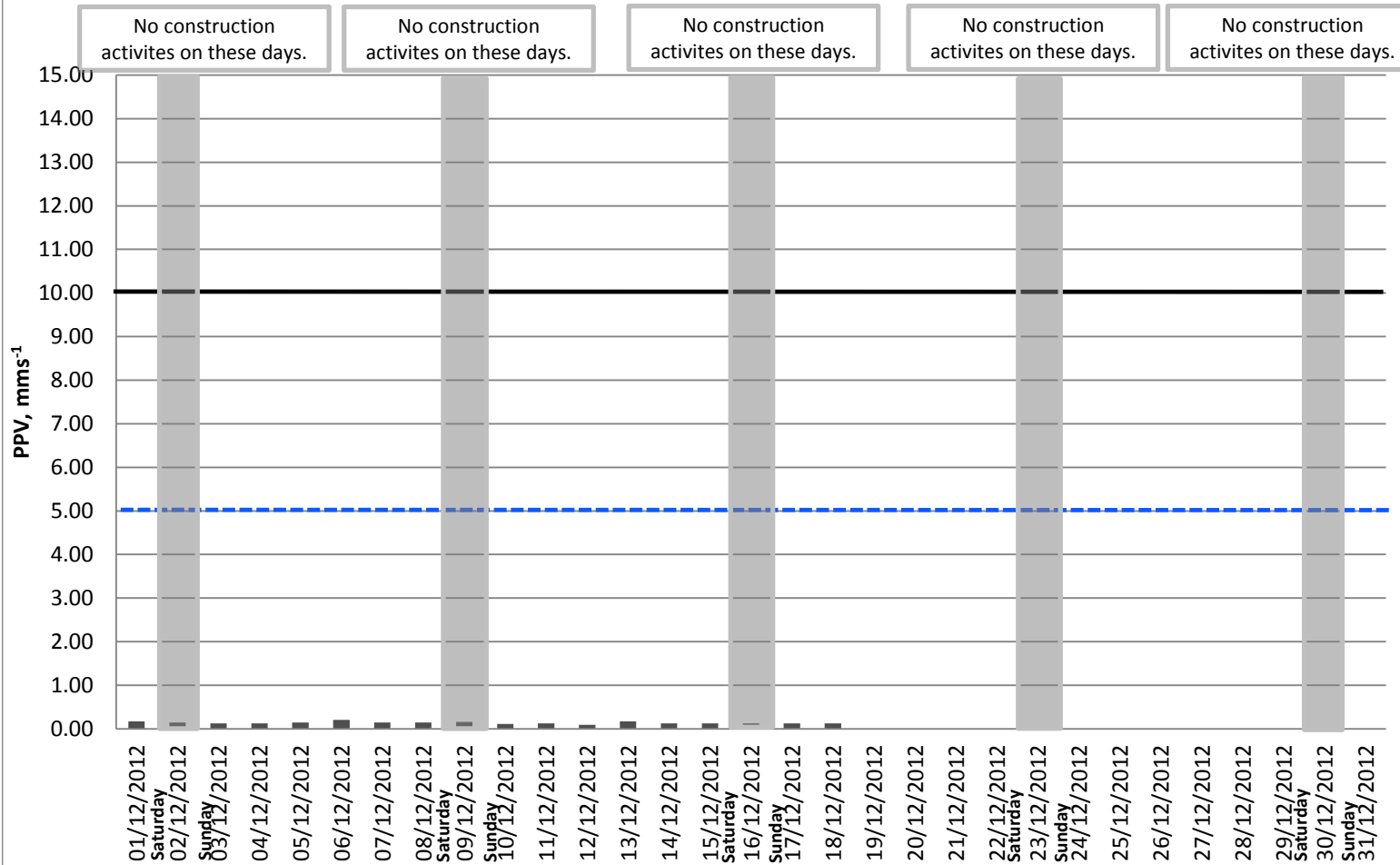
■ Daily night time VDV (z-axis)

(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 $0.40\text{ms}^{-1.75}$ 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 highest daytime Peak Particle Velocity (PPV), 15-17 Buie Rigg (CNV07) Measurement period 1st December 2012 to 31st December 2012



Construction PPV Thresholds

— Daily PPV threshold for intermittent construction

- - - Daily PPV threshold for continuous construction

Measured VDV

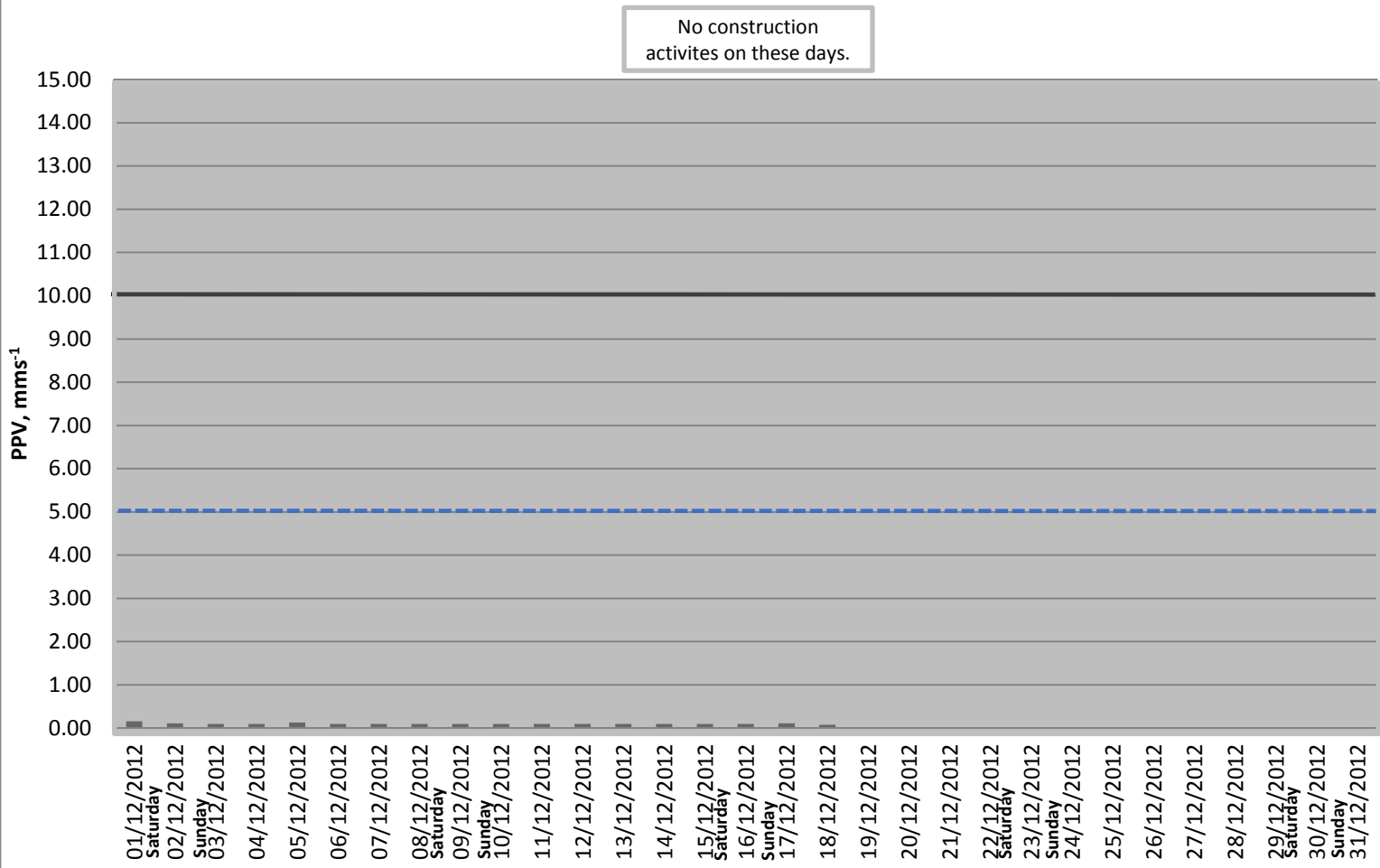
■ Daily highest PPV (z-axis)

(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 December 2012 to 31st December 2012



Construction PPV Thresholds

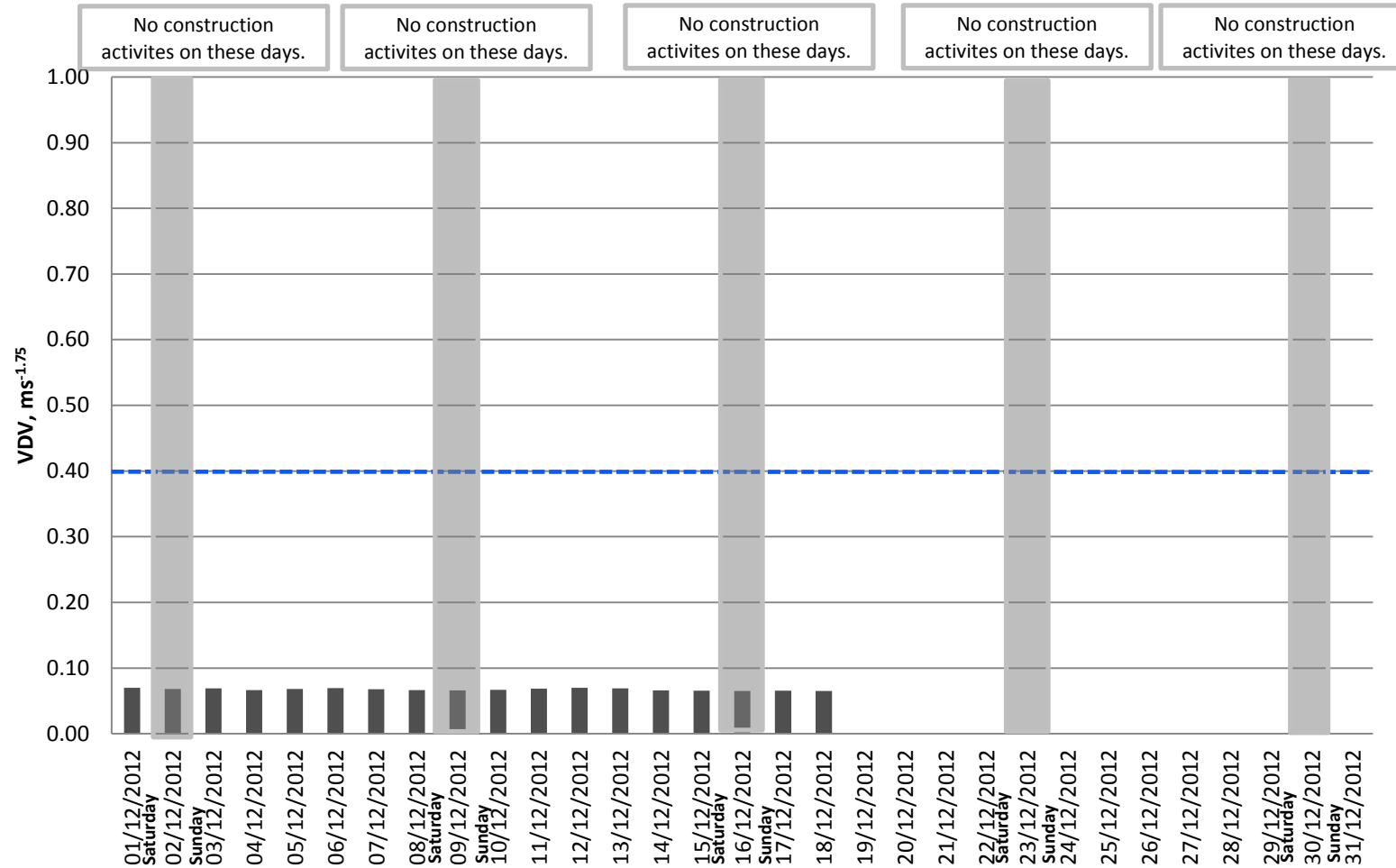
- Daily PPV threshold for intermittent construction (solid black line)
- Daily PPV threshold for continuous construction (dashed blue line)

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), 15-17 Buie Rigg (CNV07) Measurement period 1st December 2012 to 31st December 2012



Construction VDV Threshold

Daily daytime VDV
 - - - threshold for residential dwellings

Measured VDV

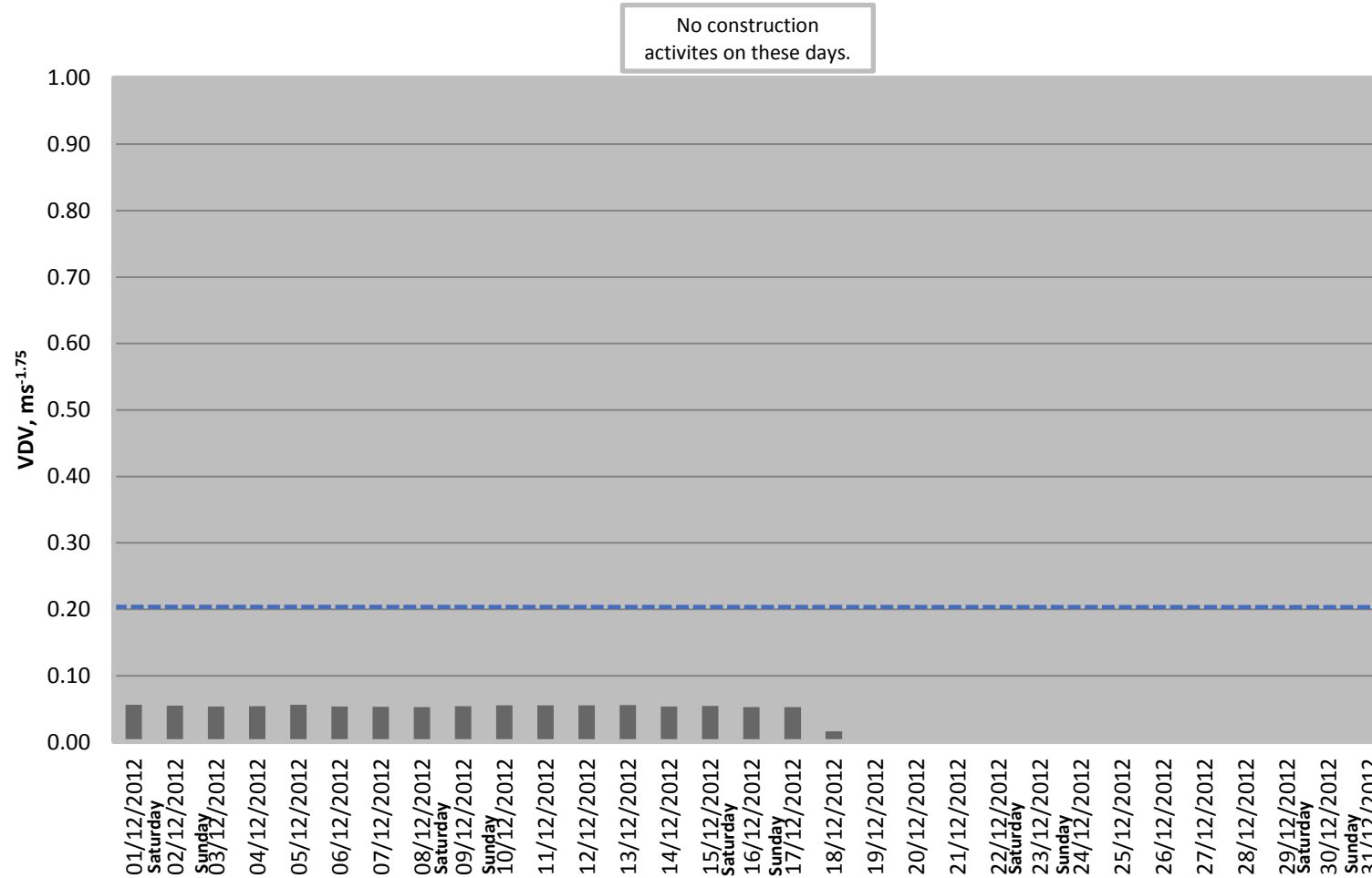
■ Daily daytime VDV (z-axis)

(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 December 2012 to 31st December 2012



Construction VDV Threshold

Daily night time VDV threshold for residential dwellings

Measured VDV

■ Daily night time VDV (z-axis)

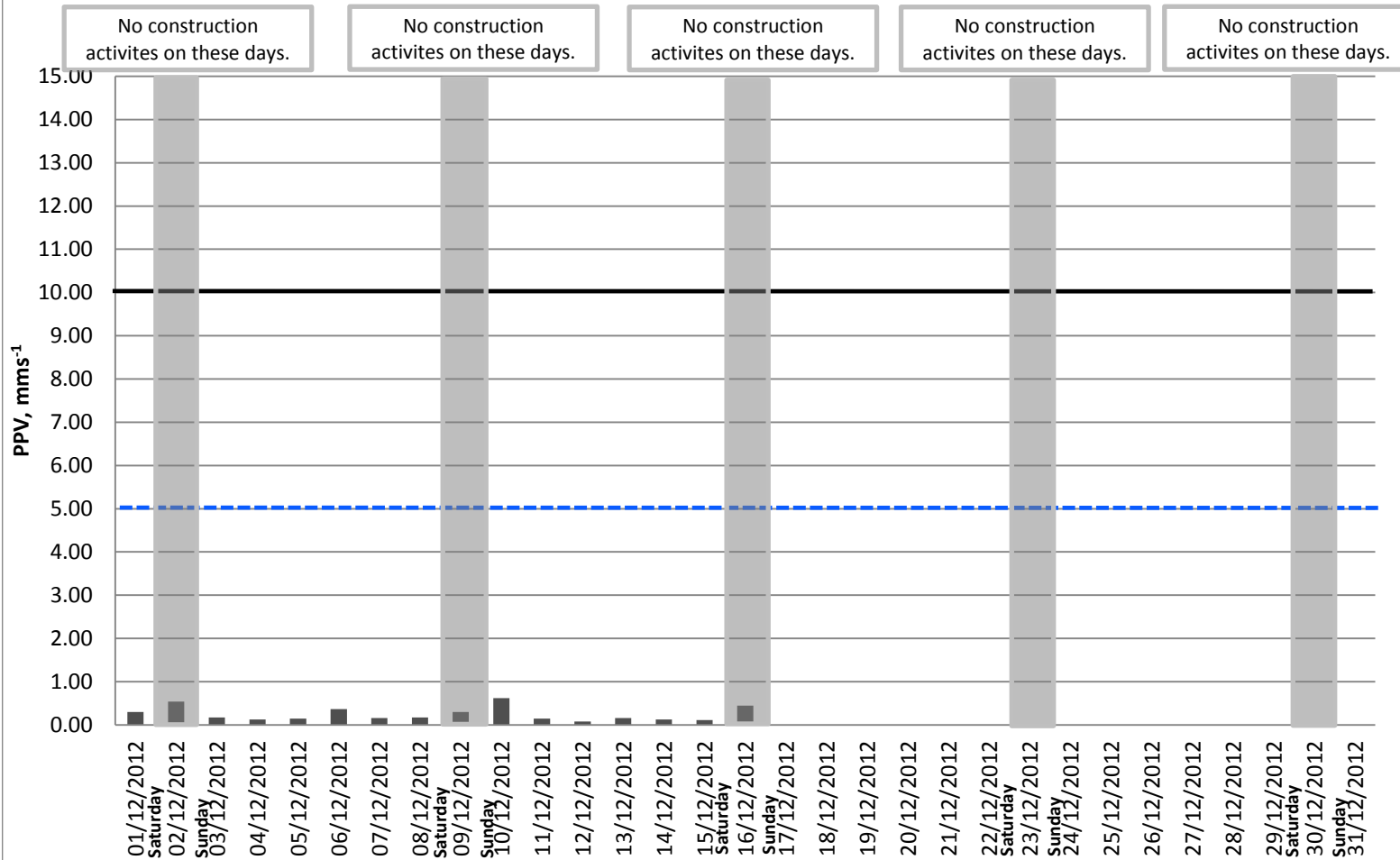
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Measured highest daytime Peak Particle Velocity (PPV), 8 Kirklands Park Grove (CNV16)

Measurement period 1st December 2012 to 31st December 2012



Construction PPV Thresholds

— Daily PPV threshold for intermittent construction

- - - Daily PPV threshold for continuous construction

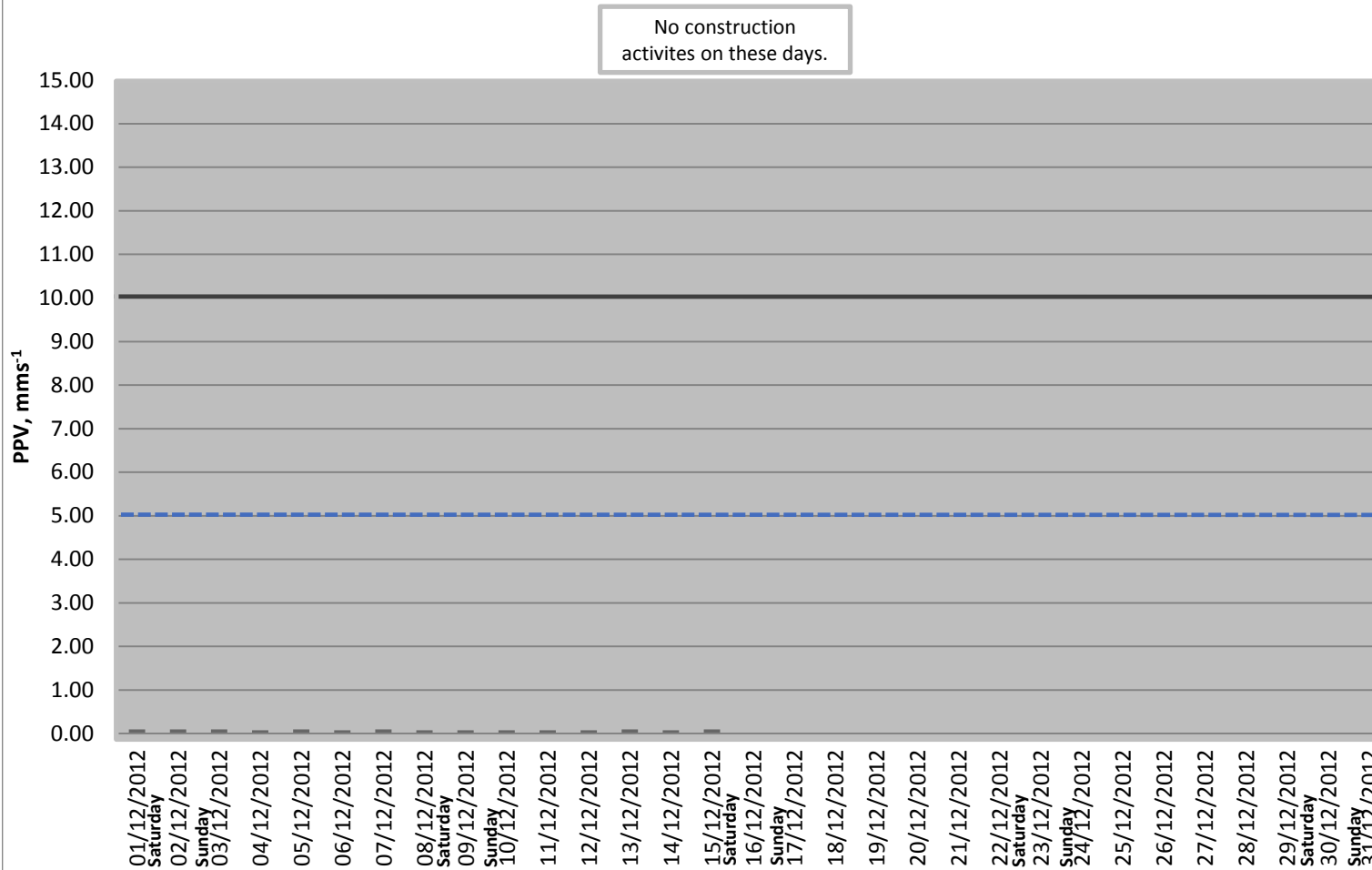
Measured VDV

■ 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 December 2012 to 31st December 2012



Construction PPV Thresholds

— Daily PPV threshold for intermittent construction

- - - Daily PPV threshold for continuous construction

Measured VDV

■ Daily highest PPV (z-axis)

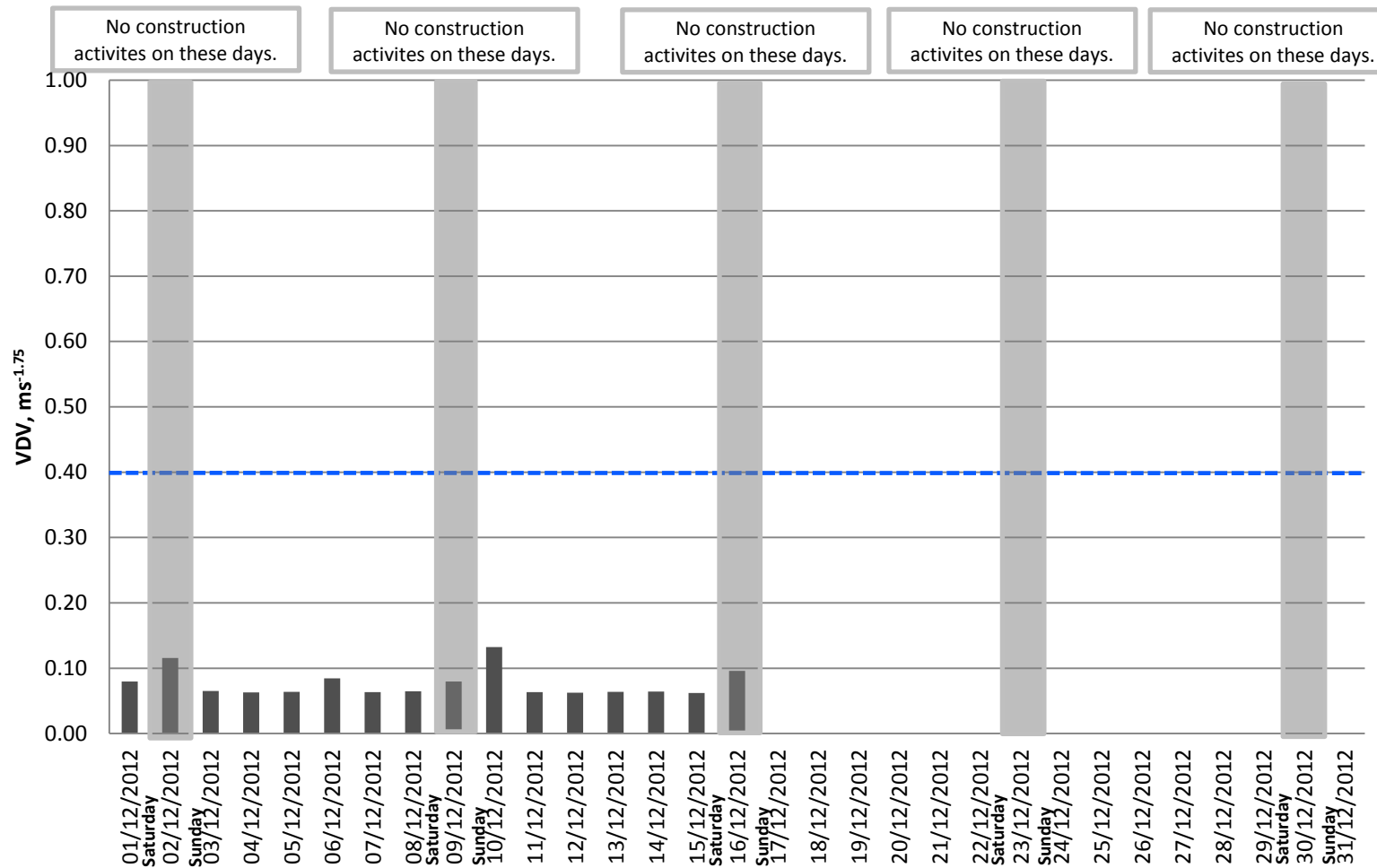
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Measured daytime (07:00-23:00) Vibration Dose Values (VDV), 8 Kirklands Park Grove (CNV16)

Measurement period 1st December 2012 to 31st December 2012



Construction VDV Threshold

Daily daytime VDV threshold for residential dwellings

Measured VDV

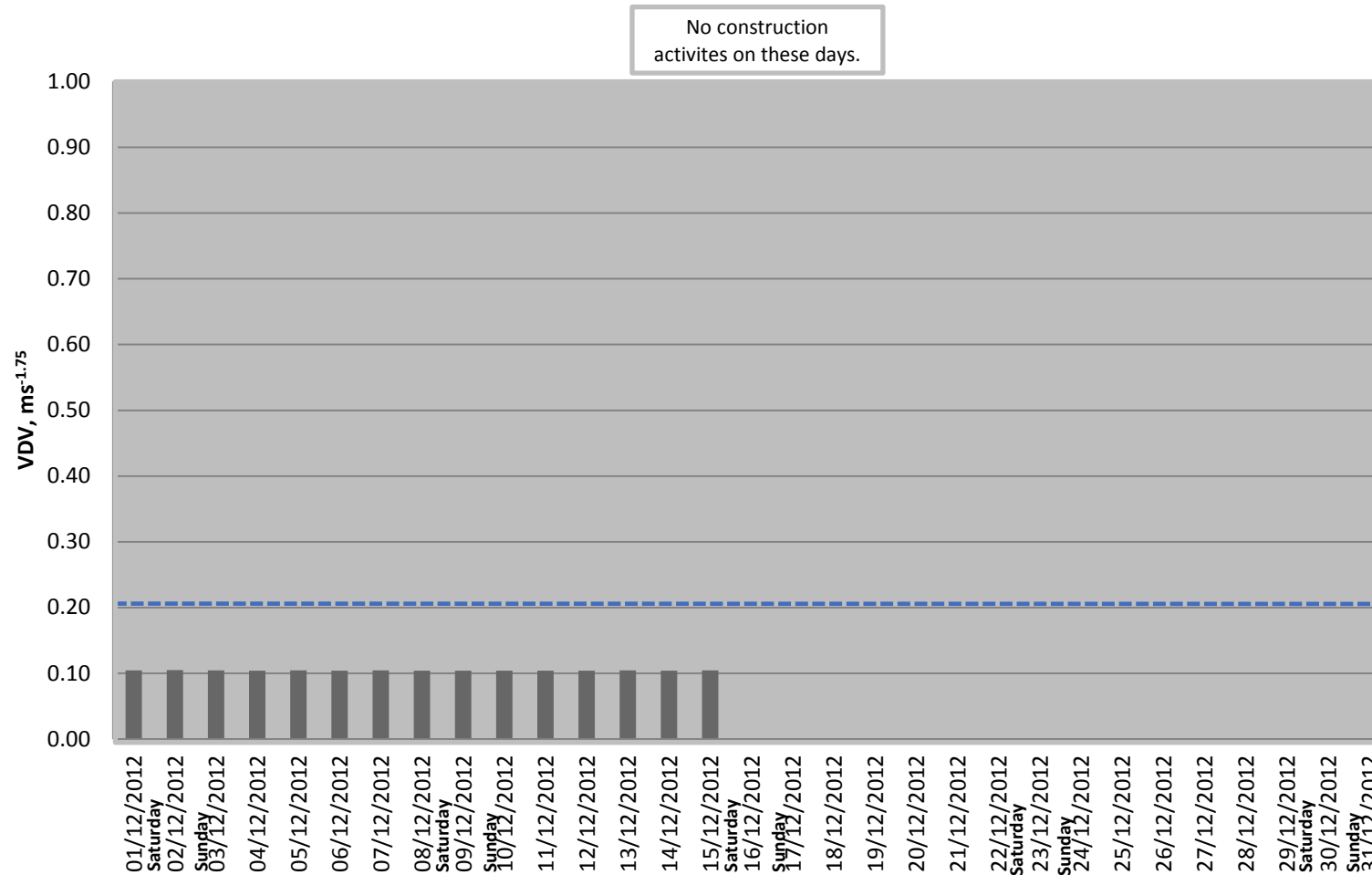
■ Daily daytime VDV (z-axis)

(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.

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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

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