Forth Replacement Crossing

Employer's Delivery Team
Construction Vibration Monitoring Report

M9 Junction 1a Contract
(September 2012)

TRANSPORT SCOTLAND

An agency of The Scottish Government

FORTH REPLACEMENT CROSSING

FORTH REPLACEMENT CROSSING

EMPLOYER'S DELIVERY TEAM
CONSTRUCTION VIBRATION MONITORING REPORT

M9 JUNCTION 1A CONTRACT
(SEPTEMBER 2012)

Revision Status

Revision	Date	Description	Author	Approved for Use
0	November 2012	Original	RML	DGC

FORTH REPLACEMENT CROSSING

EMPLOYER'S DELIVERY TEAM
CONSTRUCTION VIBRATION MONITORING REPORT

CONTENTS

1. INTRODUCTION

1.1 This report sets out the results of the construction vibration monitoring undertaken on the M9 Junction 1a Contract in September 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 September 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)	September 2012	• Fencing works north & south of Gateside • Installation of rip-rap at Niddry Burn • Communications and ITS works on M9 • Gantries 2, 3 & 4 erected
15-17 Buie Rigg (CNV07)	September 2012	• Communications and ITS works along westbound diverge • Pavement works on eastbound diverge & M9 Spur • Safety Barrier on Eastbound diverge • Concrete pours for Gantry 10 piles • Gantry 11 Pile cap • Concrete pours at Newmains Bridge • Concrete pours at M901 Overbridge • Gantry 10 erected
8 Kirklands Park Grove (CNV16)	September 2012	• Communications and ITS works along westbound diverge • Pavement works on eastbound diverge & M9 Spur • Safety Barrier works on eastbound diverge • Concrete pours for Gantry 10 piles • Gantry 11 Pile cap • Concrete pours at Newmains Bridge • Concrete pours at M901 Overbridge • Gantry 10 erected

Table 2.1 Long Term Monitoring Locations – September

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

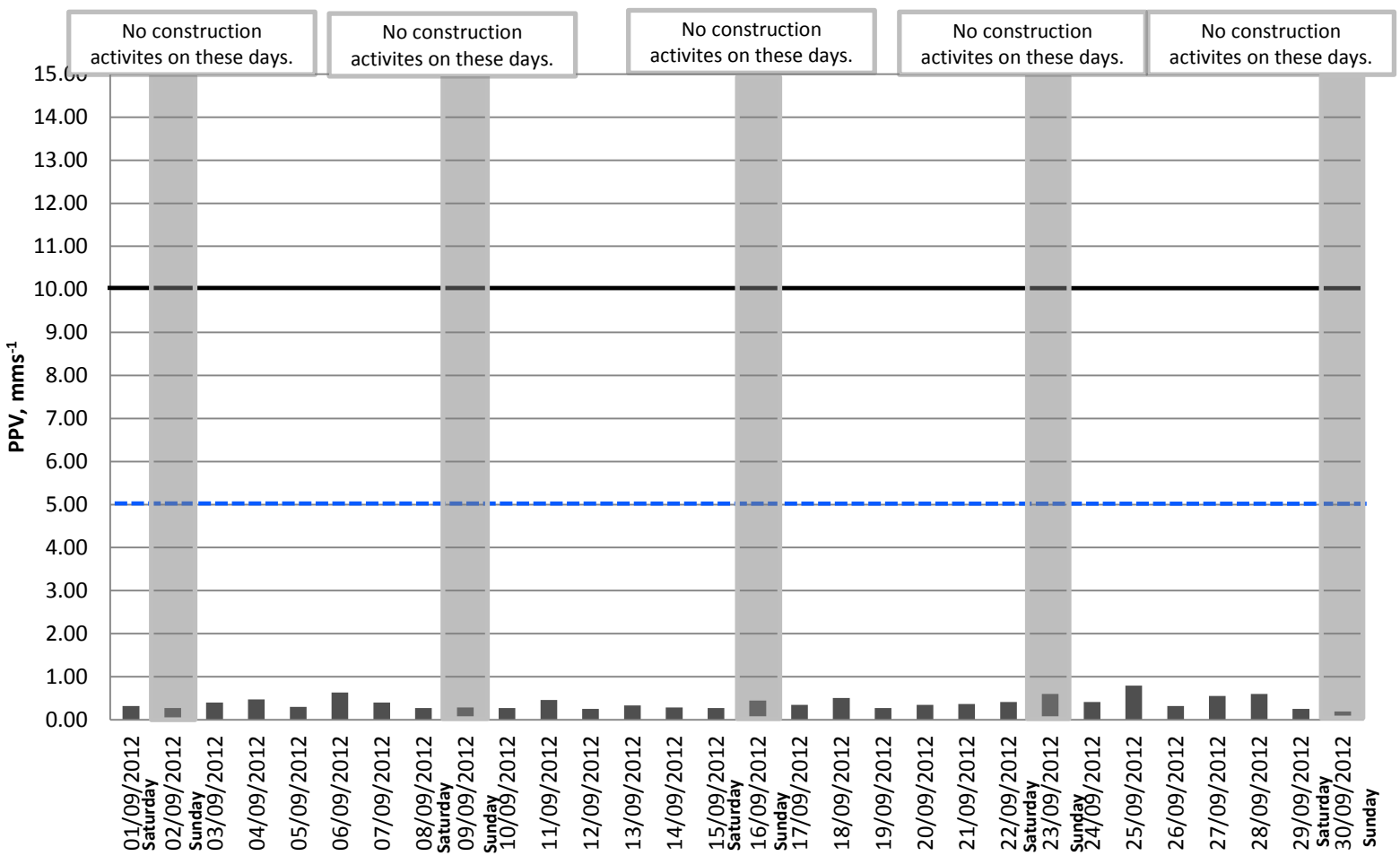
monitor the potential for disturbance to the occupants of buildings (as discussed in BS 6472) and PPV values are recorded in order to monitor the potential for damage to buildings (as discussed in BS 7385).

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 exceedences of the VDV or PPV threshold were recorded for any of the monitoring locations in the month of September.

APPENDIX A - M9 J1A CONTRACT CONSTRUCTION VIBRATION CHARTS

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



Construction PPV Thresholds

Daily PPV threshold for intermittent construction

Daily PPV threshold for continuous construction

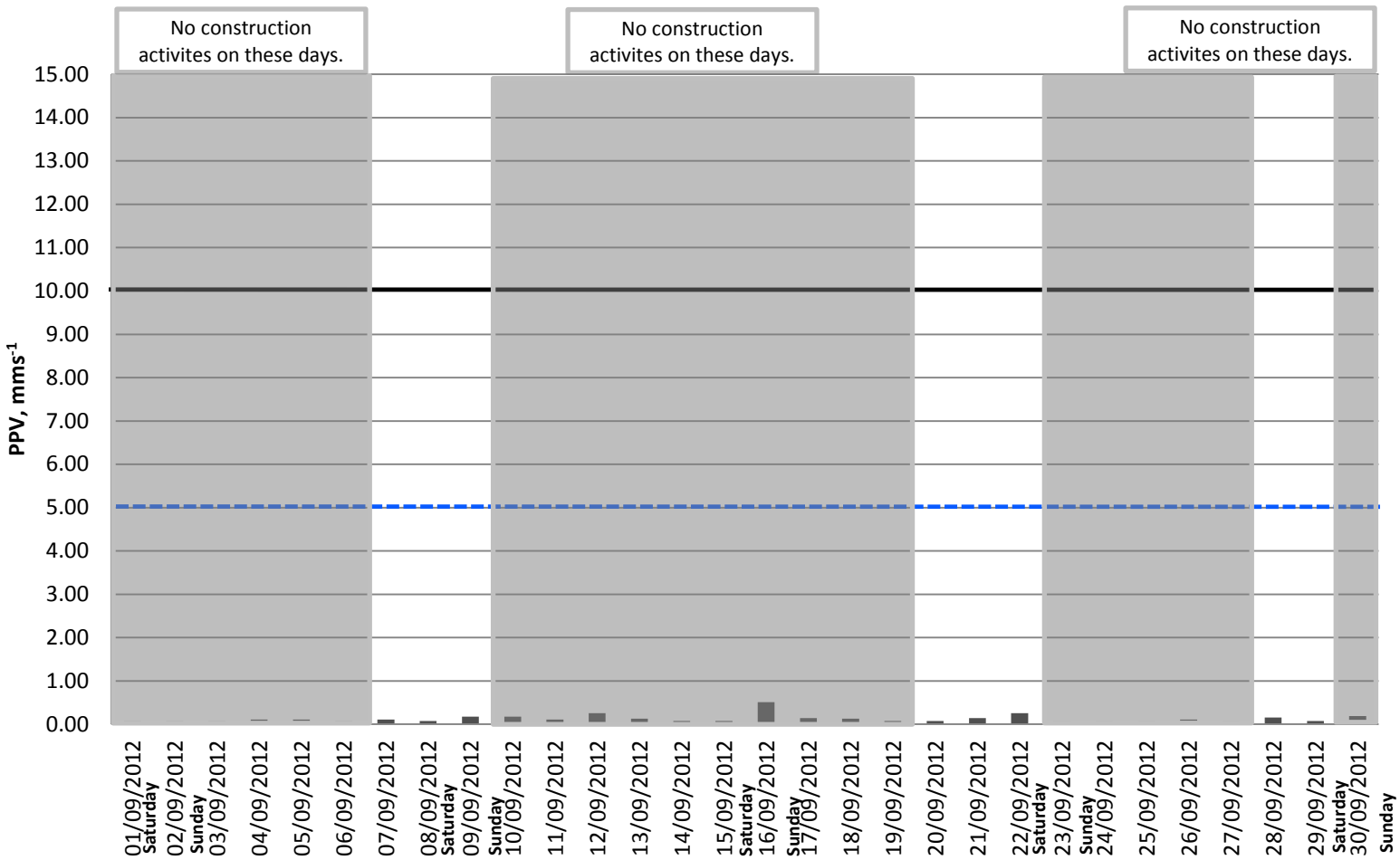
Measured VDV

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 September 2012 to 30th September 2012



Construction PPV Thresholds

Daily PPV threshold for intermittent construction

Daily PPV threshold for continuous construction

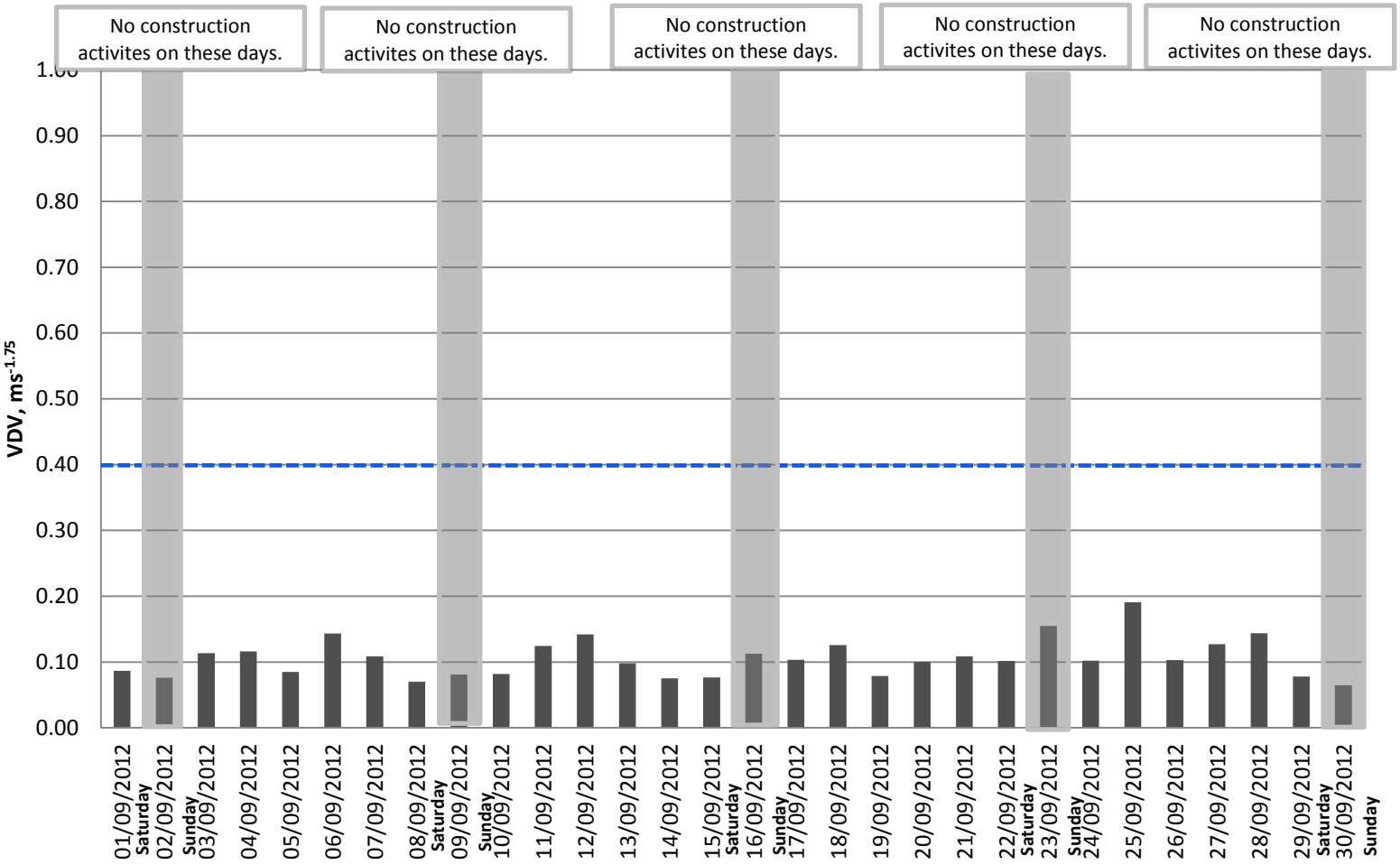
Measured VDV

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 September 2012 to 30th September 2012



Construction VDV Threshold

Daily daytime VDV threshold for residential dwellings

Measured VDV

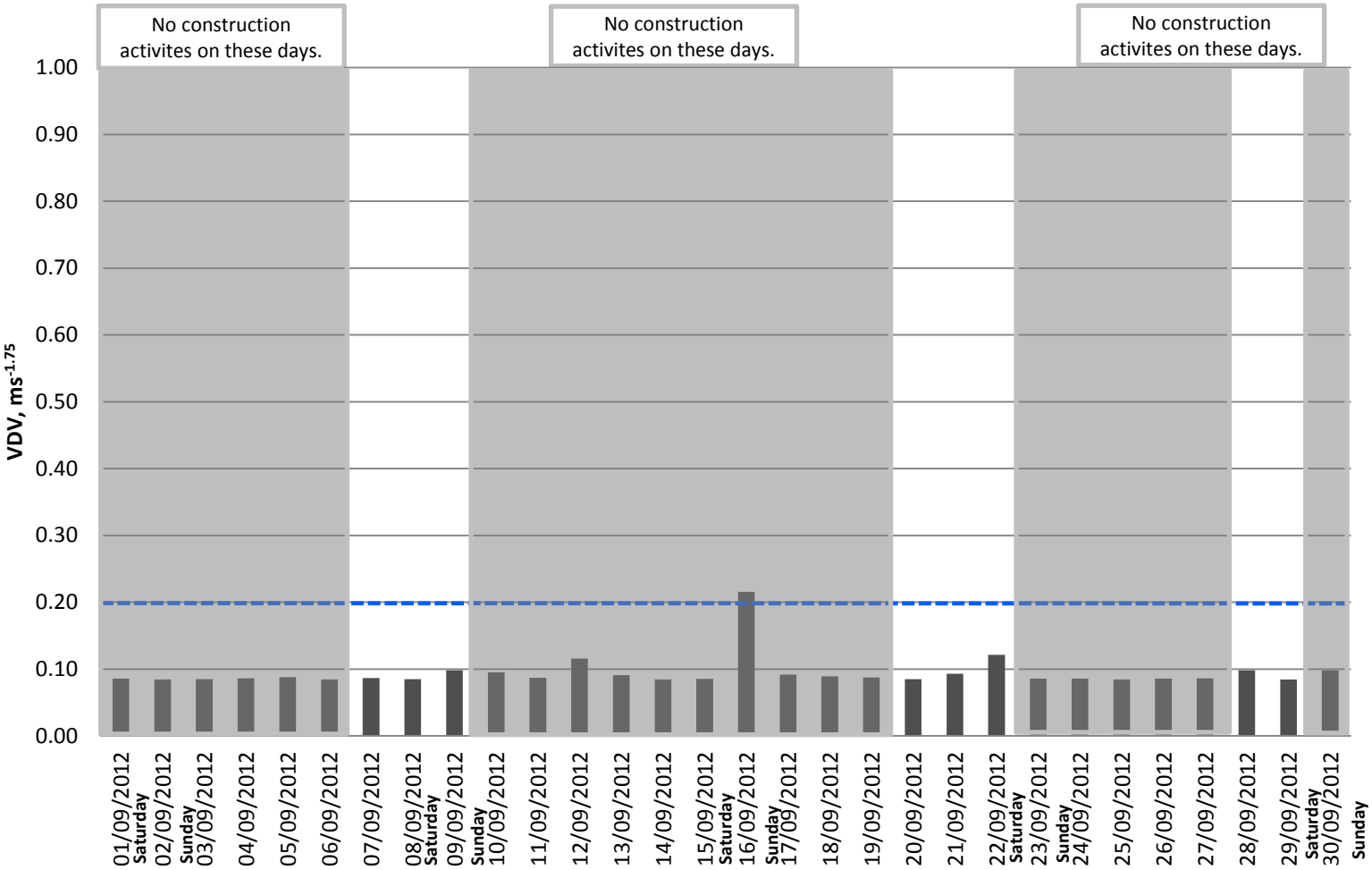
Daily daytime VDV (z-axis)

(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 0.40ms$^{-1.75}$ 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 night time (23:00-07:00) Vibration Dose Values (VDV), 93/95 King Edwards Way (CNV02) Measurement period 1st September 2012 to 30th September 2012



Construction VDV Threshold

Daily night time VDV threshold for residential dwellings

Measured VDV

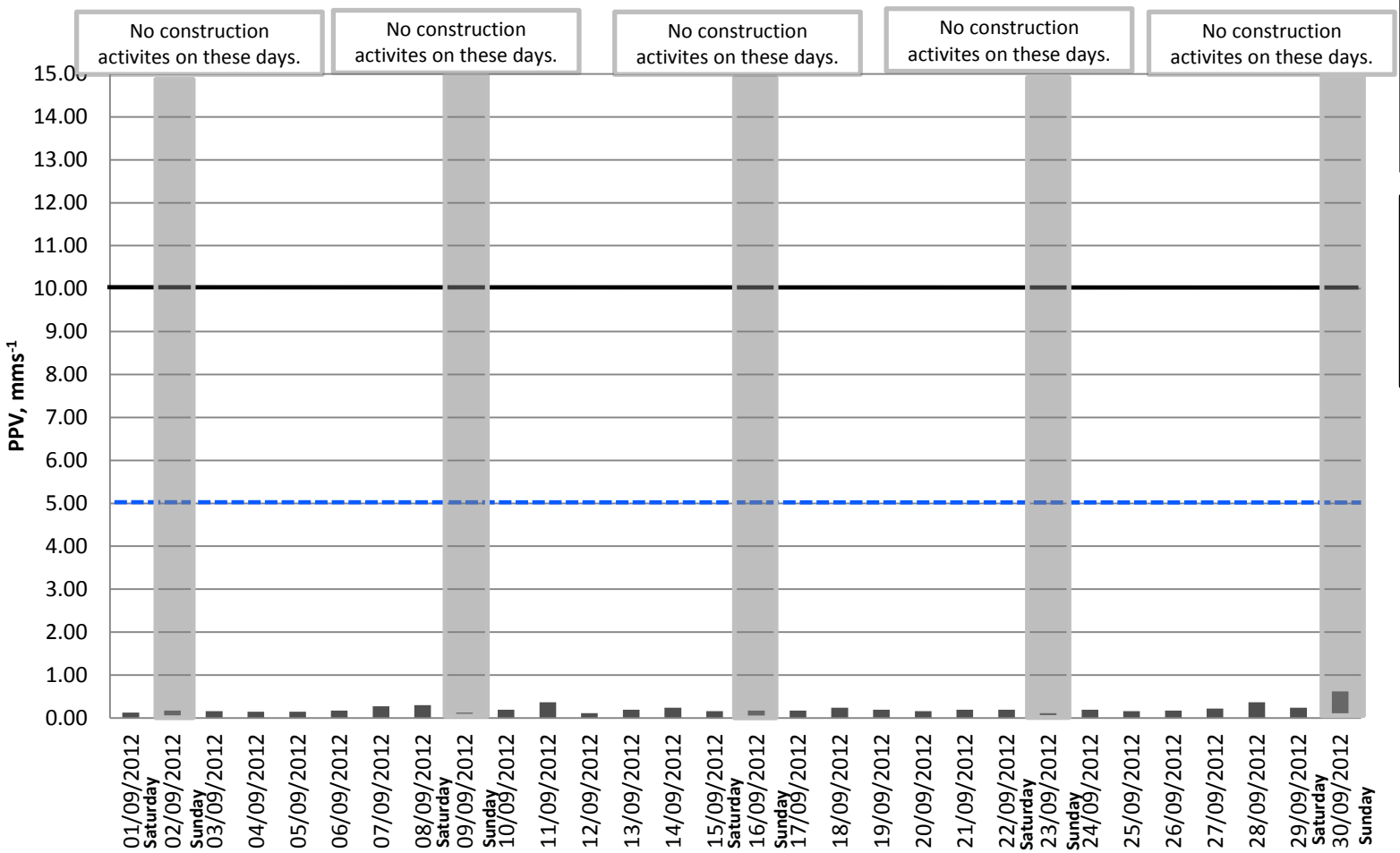
Daily night time VDV (z-axis)

(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$^{-1.75}$ 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), 15-17 Buie Rigg (CNV07) Measurement period 1st September 2012 to 30th September 2012



Construction PPV Thresholds

Daily PPV threshold for intermittent construction

Daily PPV threshold for continuous construction

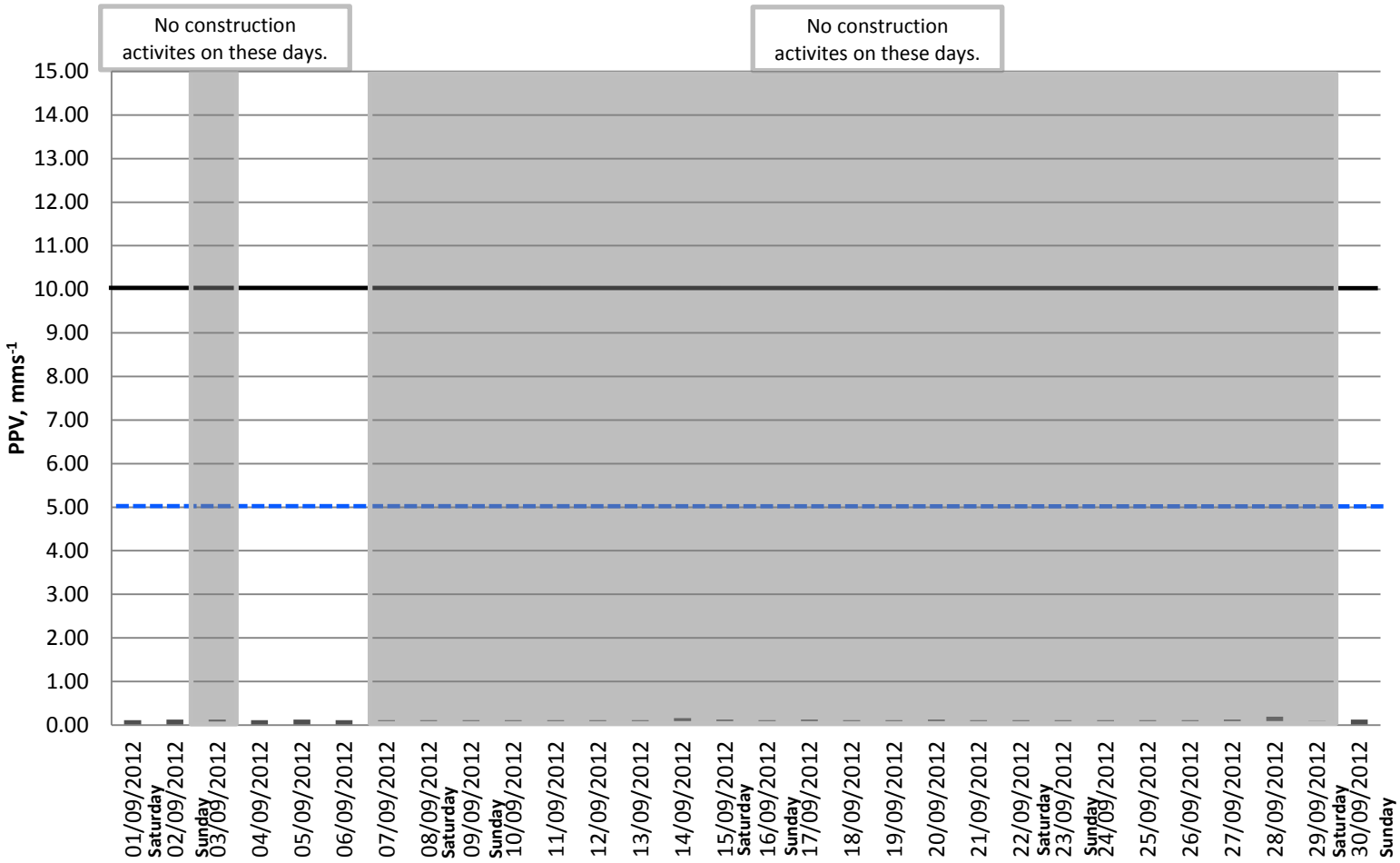
Measured VDV

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 September 2012 to 30th September 2012



Construction PPV Thresholds

Daily PPV threshold for intermittent construction

Daily PPV threshold for continuous construction

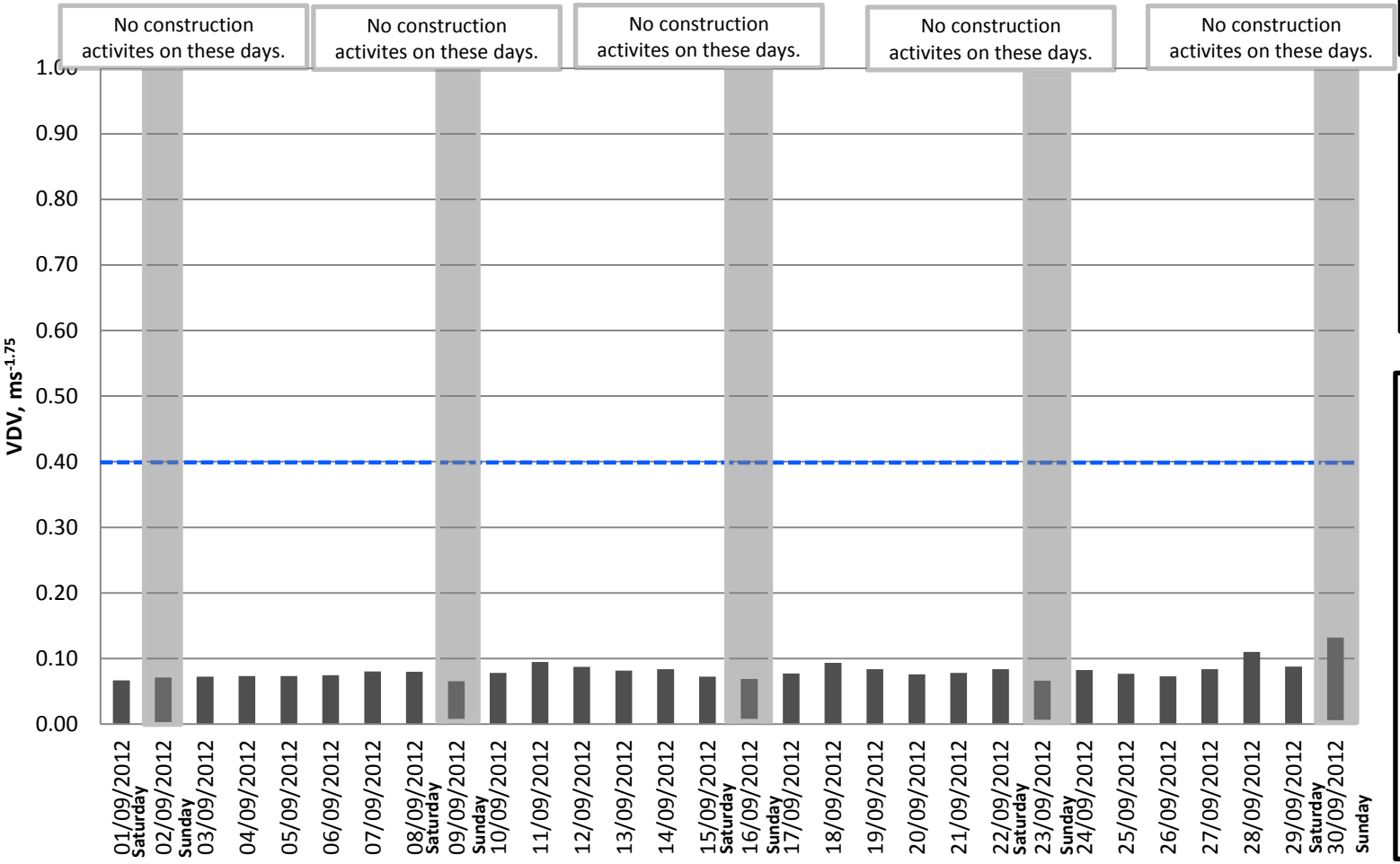
Measured VDV

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 September 2012 to 30th September 2012



Construction VDV Threshold

Daily daytime VDV threshold for residential dwellings

Measured VDV

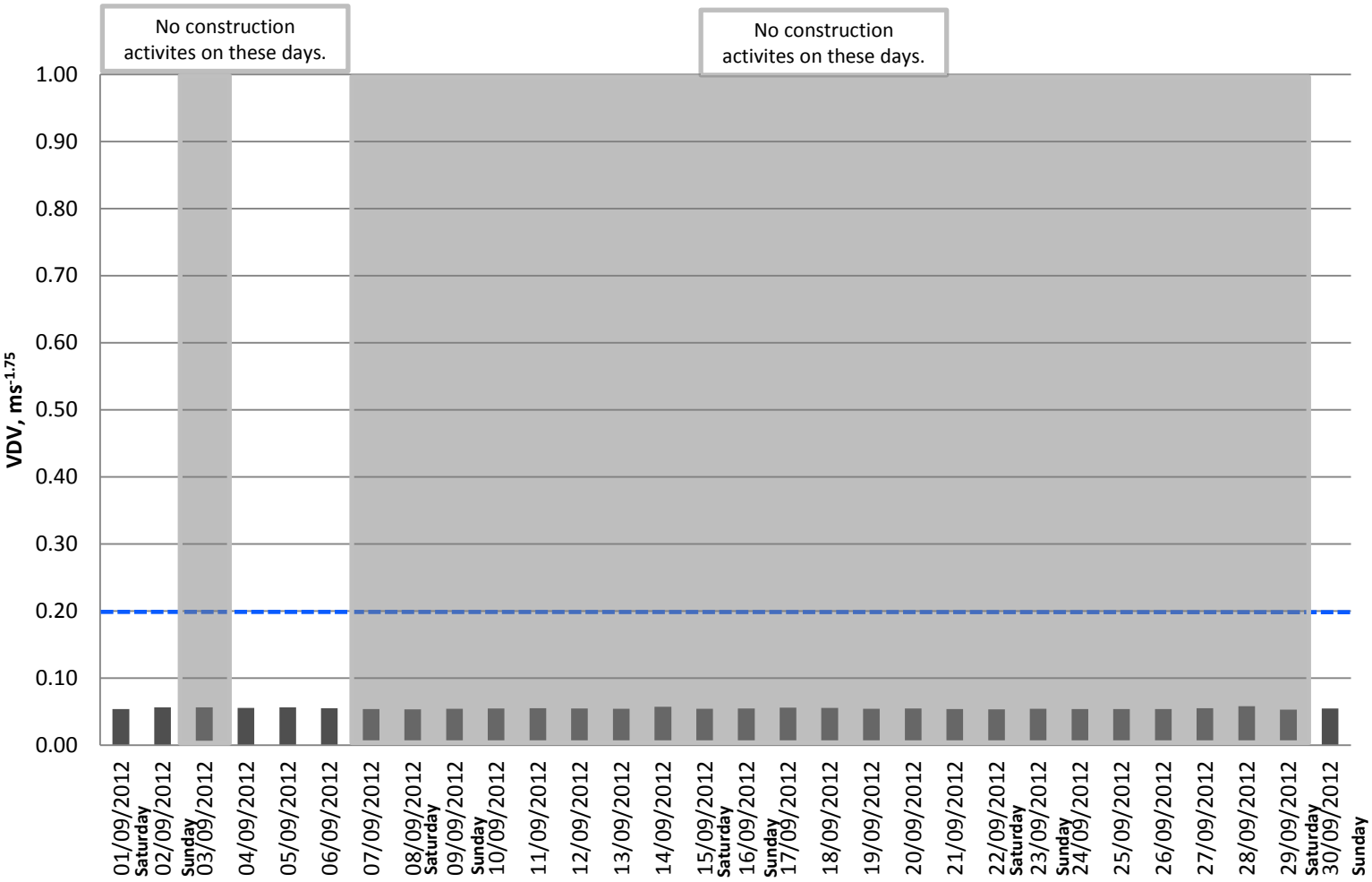
Daily daytime VDV (z-axis)

(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 0.40ms$^{-1.75}$ 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 night time (23:00-07:00) Vibration Dose Values (VDV), 15-17 Buie Rigg (CNV07)
Measurement period 1st September 2012 to 30th September 2012



Construction VDV Threshold

Daily night time VDV threshold for residential dwellings

Measured VDV

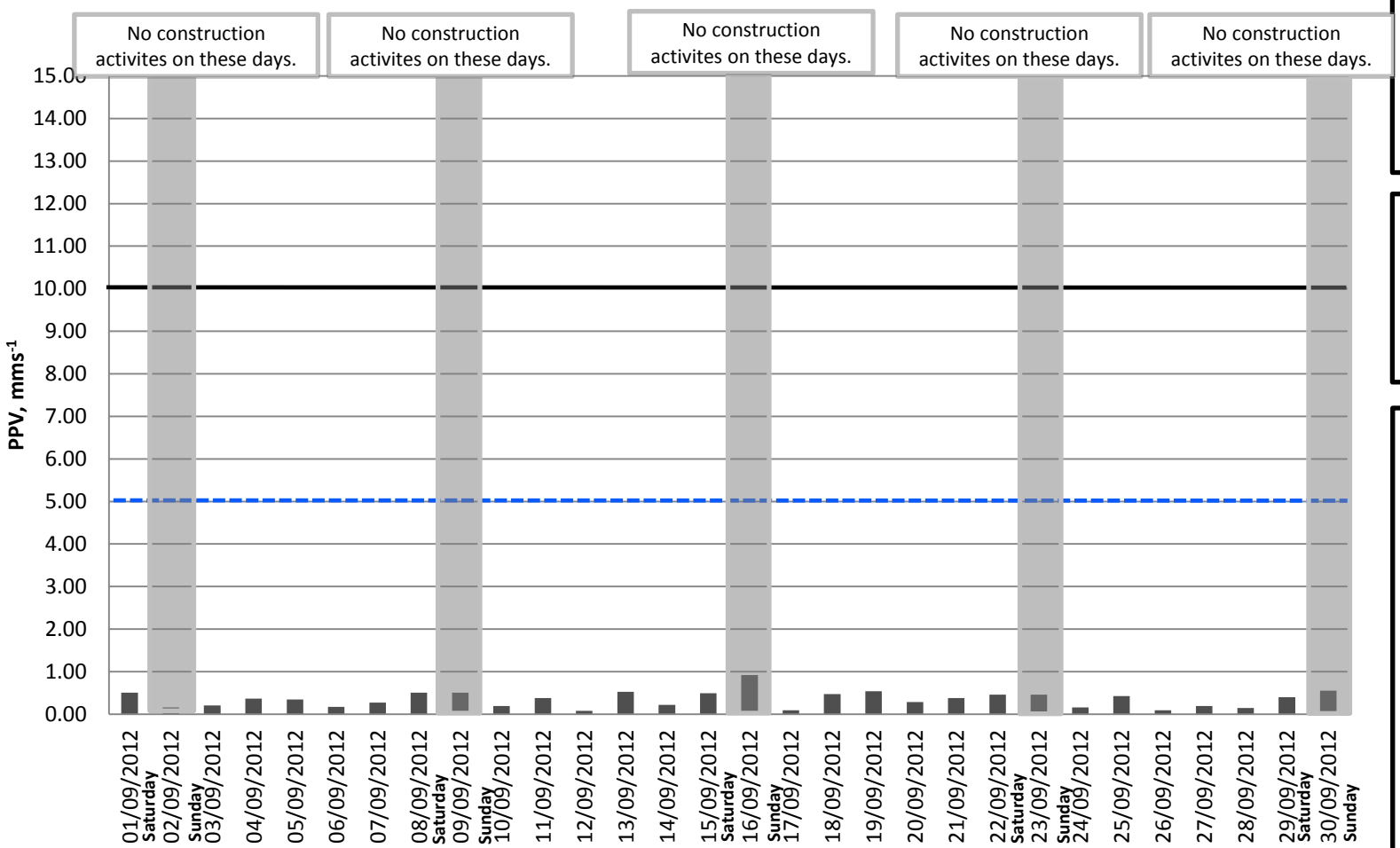
Daily night time VDV (z-axis)

(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 September 2012 to 30th September 2012



Construction PPV Thresholds

Daily PPV threshold for intermittent construction

Daily PPV threshold for continuous construction

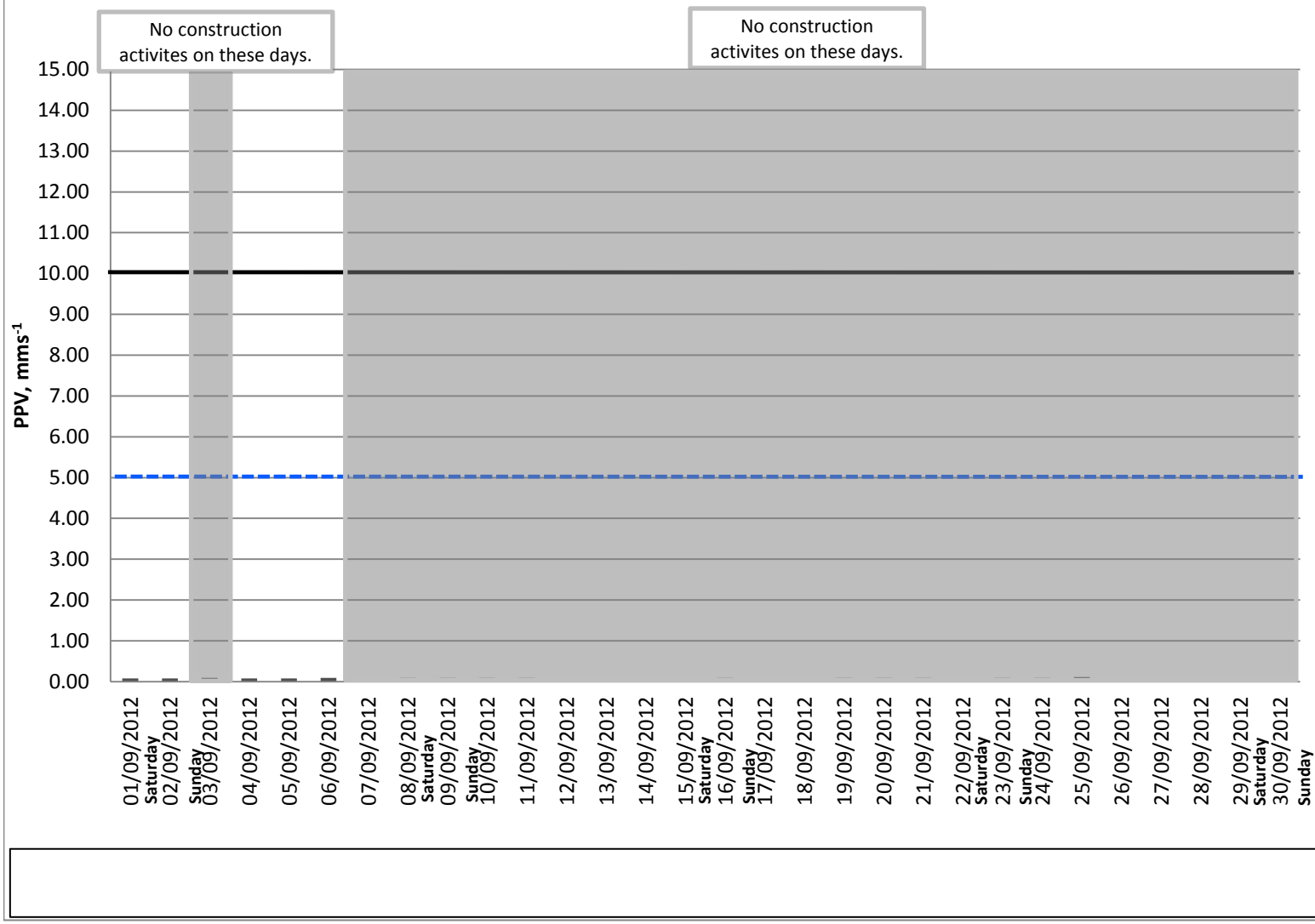
Measured VDV

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 September 2012 to 30th September 2012



Construction PPV Thresholds

Daily PPV threshold for intermittent construction

Daily PPV threshold for continuous construction

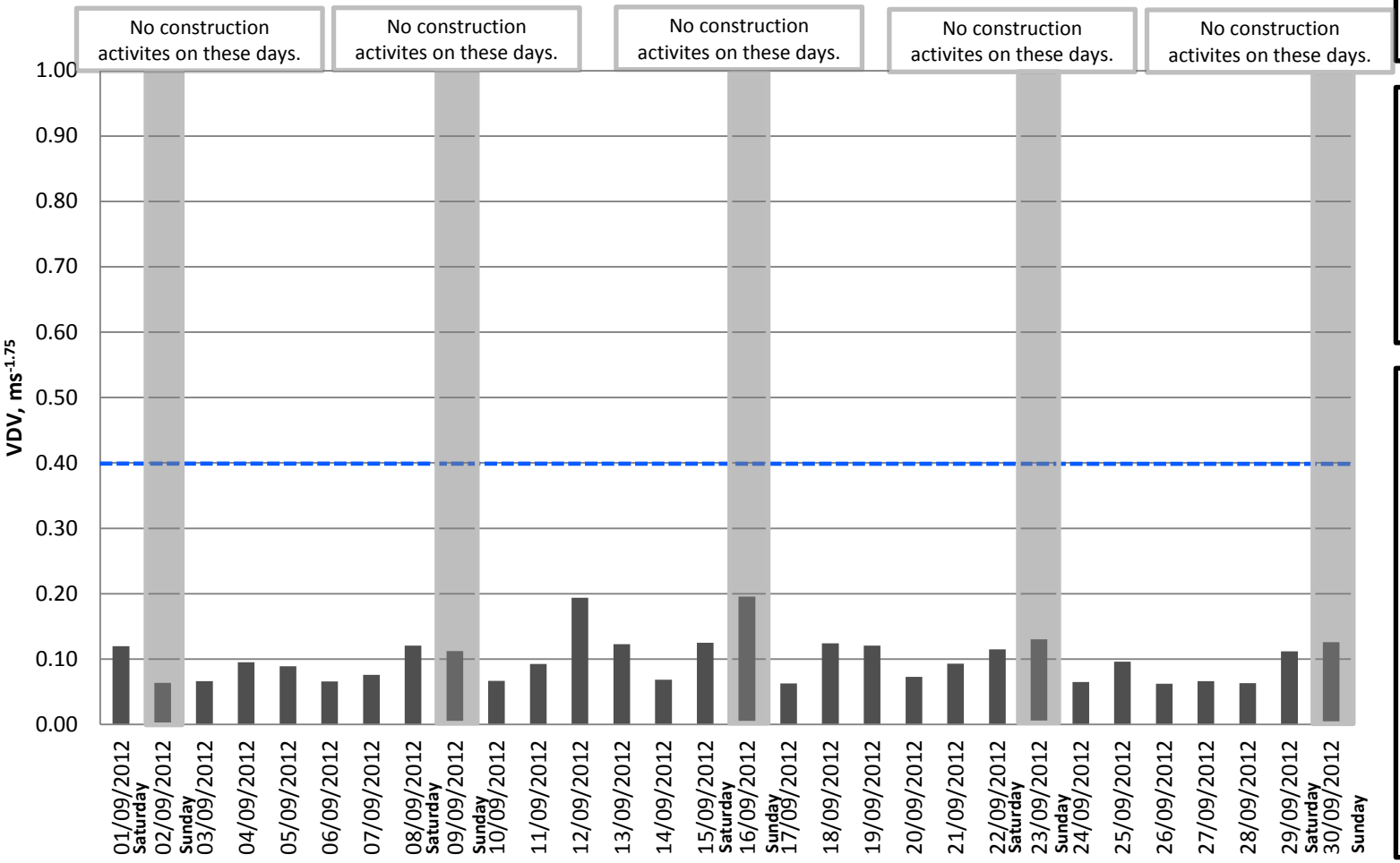
Measured VDV

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), 8 Kirklands Park Grove (CNV16) Measurement period 1st September 2012 to 30th September 2012



Construction VDV Threshold

Daily daytime VDV threshold for residential dwellings

Measured VDV

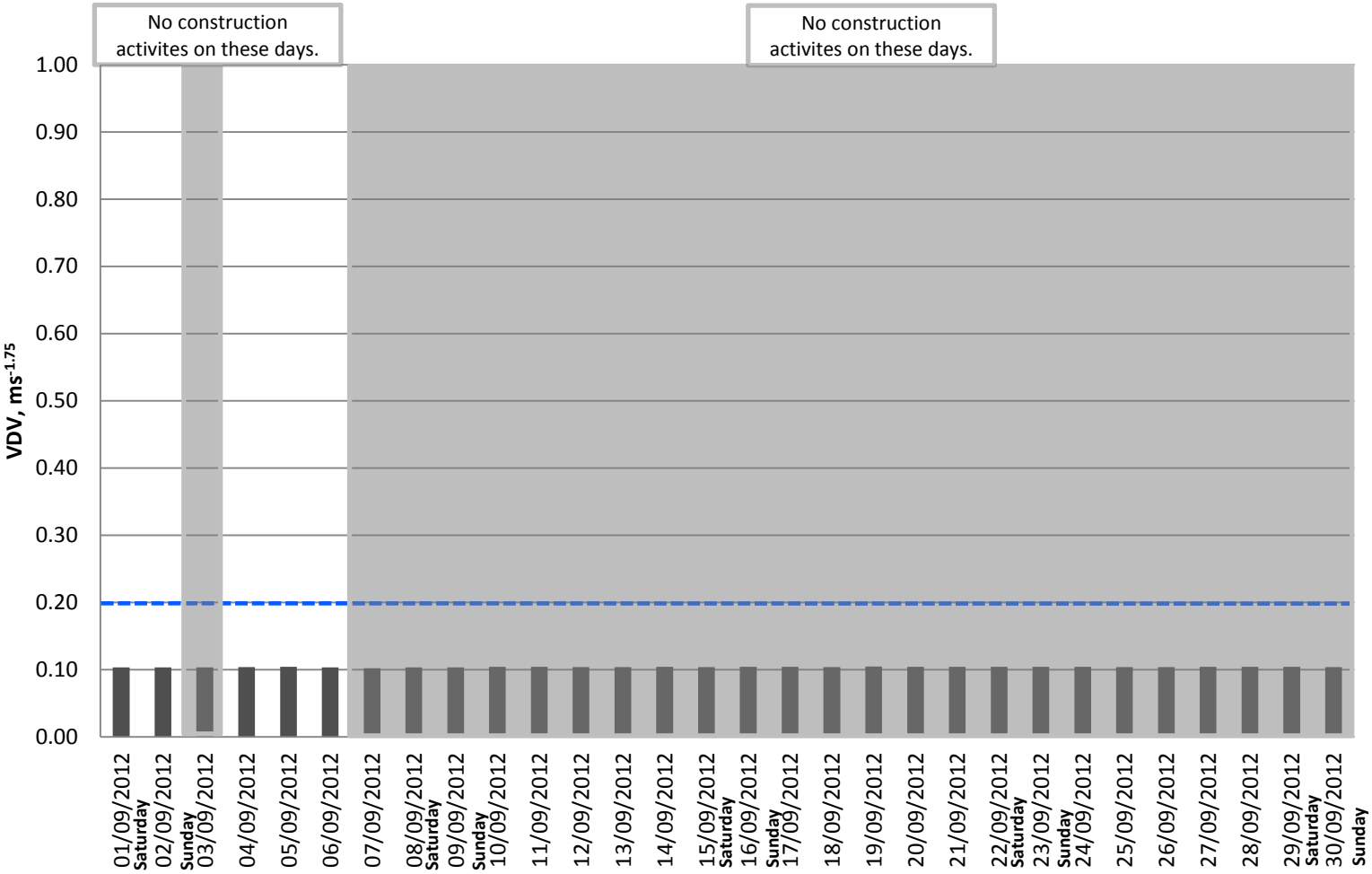
Daily daytime VDV (z-axis)

(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 0.40ms$^{-1.75}$ 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 night time (23:00-07:00) Vibration Dose Values (VDV), 8 Kirklands Park Grove (CNV16) Measurement period 1st September 2012 to 30th September 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$^{-1.75}$ 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.