Iluka Resources Limited

Wimmera Project

Baseline Vibration Assessment

April 2019

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1. Introduction

1.1 Acknowledgement of country

The project team would like to acknowledge the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagalk Nations who are the traditional custodians of the land upon which noise, vibration and meteorological measurements were conducted during this assessment. We pay our respects to Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagalk Elders, past and present and extend this respect to all Aboriginal and Torres Strait people who may be reading this document.

1.2 Context

GHD Pty Ltd (GHD) was engaged by Iluka Resources Limited (Iluka) to prepare a baseline vibration assessment for Wimmera Project site (herein after 'the Project site').

It is understood that Iluka is currently preparing a preliminary feasibility study for the Wimmera Project. This report presents the results of a baseline vibration monitoring assessment and the establishment of relevant vibration impact assessment criteria at the nearest identified vibration sensitive receivers relevant to the Project site. This will allow for a future analysis of potential vibration impacts from mining operations to be made.

1.3 Purpose of this report

The purpose of the assessment in this report is to carry out a baseline vibration monitoring assessment and establish applicable vibration assessment criteria for the Wimmera Project.

1.4 Scope of works

The scope of works conducted for this assessment was as follows:

- Characterise the vibration environment at nearest sensitive receivers pertinent to the proposed mining operations and the extraction of reserves from the project site.
- Outline applicable regulatory requirements, guidelines or standards relevant to the assessment of vibration impacts.
- Analyse acquired data and provide recommendations on applicable vibration limits and any additional scope of work that may be necessary to establish operations at the mine site.

1.5 Scope and limitations

This report has been prepared by GHD for Iluka Resources Limited and may only be used and relied on by Iluka Resources Limited for the purpose agreed between GHD and the Iluka Resources Limited as set out in section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than Iluka Resources Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.6 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Iluka Resources Limited and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1.6 Assumptions

The following assumptions were made in the preparation of this vibration assessment:

- This report has been written based on the information available as of March 2019
- The selected monitoring locations are reasonably representative of the existing background environment at relevant vibration sensitive receivers

2. Project site

2.1 Location

The Project site is to be located within Clear Land and will be surrounded mainly by farming land, with some residential premises located nearby. The Project site is located on land zoned as Farming Zone (FZ), Public Conservation, and Resource Zone. The Indicative Project Extent with respect to the surrounding land uses are shown in Figure 1. The mine layout and footprint will be determined during the Pre-feasibility Study (PFS).

2.2 Vibration sensitive receptors

Relevant vibration sensitive receivers at various distances are identified in Table 1 and shown in Figure 1. Vibration sensitive receivers are typically considered as follows:

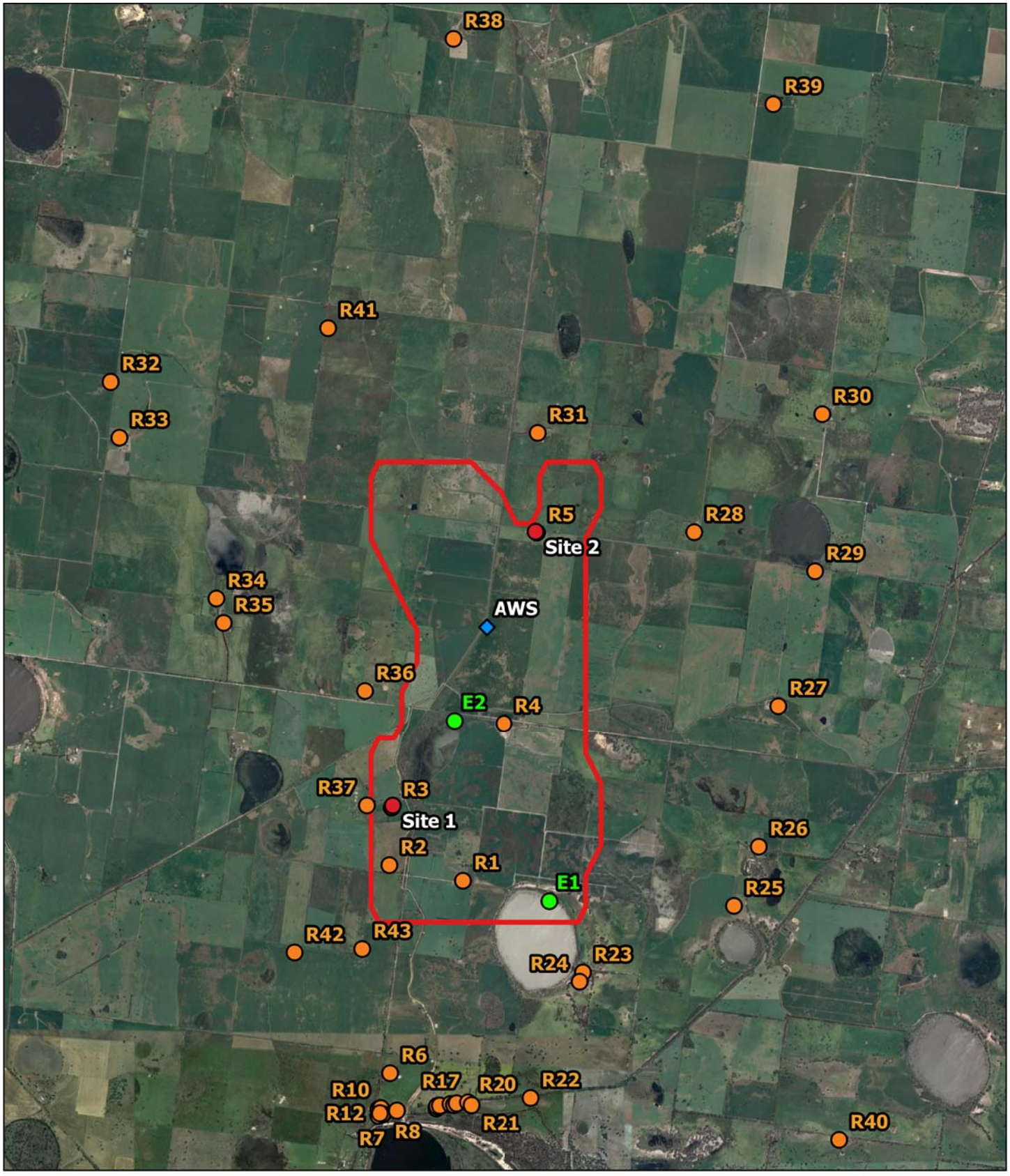
- Where there is a potential for normal activities to be affected by adverse vibration levels (i.e. consideration of Human Comfort vibration limits).
- Where structural damage to buildings may occur, consideration is also given to commercial and heritage buildings as well as residential and other types of accommodation buildings.

Table 1 Potential vibration sensitive receivers

ID	Easting	Northing	Approx. distance to Indicative Project Extent (km)	Assessed status
E1 [1]	586035.4	5909092.5	0	Environmental receiver
E2	584482.8	5912035.9	0	Environmental receiver
R1	584617.2	5909425.5	0	Appears residential
R2	583422.8	5909679.1	0	Appears residential
R3	583461.9	5910616.3	0	Appears residential
R4	585290.8	5911994.8	0	Appears residential
R5	585834.4	5915102.1	0	Appears residential
R6	583434.2	5906296.3	2.4	Appears residential
R7	583246.3	5905607.3	3.2	Appears residential
R8	583327.1	5905644.7	3.1	Appears residential
R9	583246.5	5905715.3	3	Appears residential
R10	583284.8	5905729.4	3	Appears residential
R11	583308.7	5905635.1	3.1	Appears residential
R12	583268.9	5905647.7	3.1	Appears residential
R13	583545.0	5905690.8	3.1	Appears residential
R14	584187.0	5905728.2	3	Appears residential
R15	584196.5	5905763.3	3	Appears residential
R16	584242.2	5905771.4	3	Appears residential
R17	584414.5	5905796.3	3	Appears residential

ID	Easting	Northing	Approx. distance to Indicative Project Extent (km)	Assessed status
R18	584470.6	5905784.8	3	Appears residential
R19	584513.1	5905808.9	3	Appears residential
R20	584698.5	5905823.0	3	Appears residential
R21	584756.8	5905779.8	3	Appears residential
R22	585729.6	5905893.3	2.9	Appears residential
R23	586580.7	5907934.6	0.8	Appears residential
R24	586526.6	5907784.5	1	Appears residential
R25	589031.9	5909017.1	2.4	Appears residential
R26	589433.7	5909979.2	2.6	Appears residential
R27	589750.9	5912278.1	3.1	Appears residential
R28	588386.5	5915108.2	1.7	Appears residential
R29	590348.3	5914473.0	3.7	Appears residential
R30	590465.3	5917027.7	3.7	Appears residential
R31	585846.3	5916723.1	0.5	Appears residential
R32	578898.5	5917548.2	4.5	Appears residential
R33	579041.3	5916645.2	4.1	Appears residential
R34	580615.7	5914029.9	2.6	Appears residential
R35	580733.9	5913633.4	2.6	Appears residential
R36	583027.2	5912526.1	0.6	Appears residential
R37	583058.3	5910650.3	0.05	Appears residential
R38	584464.6	5923123.1	6.9	Appears residential
R39	589670.7	5922060.3	6.5	Appears residential
R40	590738.7	5905219.6	5.5	Appears residential
R41	582428.9	5918418.1	2.4	Appears residential
R42	581883.8	5908259.5	1.4	Shed(2)
R43	582982.2	5908315.2	0.5	Shed(2)

(1) Receivers designated with an 'E' are environmentally sensitive receptors such as water bodies or areas of natural significance within the area.
(2) Based on aerial imagery, this receptor does not appear to be a residential dwelling. Further clarification to be sought from the relevant authorities.



LEGEND

- Indicative project extent
- Sensitive receiver
- Environmental receiver
- Vibration logger location
- Automatic weather station

Paper Size A4

0 1000 2000 m

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 56

N

GHD

Iluka Resources Limited
WIM100
Baseline Noise Assessment

Site and identified vibration sensitive recievers

Project No. 3136874
Revision No. -
Date. 27/03/2019

FIGURE 1

3. Vibration criteria

3.1 Human comfort vibration criteria

In the absence of any Victorian guidelines for vibration criteria, human comfort vibration criteria have been set with consideration to the following:

- NSW EPA *Environmental Noise Management – Assessing Vibration: A Technical Guideline* (AVTG) (NSW EPA, February 2006)
- British Standard 6472: *Guide to Evaluation of Human Exposure to Vibration in Buildings Part 1: Vibration Sources Other than Blasting* (British Standards, 2008)
- BS 5228-2:2009 *Code of Practice for Noise and Vibration on Construction and Open Sites – Part 2: Vibration* (British Standards, 2009)

Table 2 summarises the recommended human comfort targets specified as Peak Particle Velocity (PPV) vibration levels as measured within an occupied space (referenced from the NSW EPA Technical Guideline).

Table 2 Recommended human comfort vibration levels (AVTG)

Location	Peak Particle Velocity (PPV) , mm/s	
	Preferred	Maximum
Critical areas[1]	0.14	0.28
Residences – daytime[2]	0.28	0.56
Residences – night time[2]	0.2	0.4
Offices, schools, educational institutions and places of worship	0.56	1.1
Workshops	1.1	2.2

(1) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be need to assess intermittent values against the continuous or impulsive criteria for critical areas.

(2) Day-time is 7.00 am to 10.00 pm and night-time is 10:00 pm to 7.00 am.

Table 3 presents the typical threshold of perception for vibration based on the guidance provided in the BS 5528-2. It can be seen from Table 3 that peak vibration levels below 0.14 mm/s are unlikely to be perceptible with vibration levels below 0.3 mm/s described as just perceptible in residential environments.

Table 3 Guidance on the effects of vibration levels (BS 5228.2)

Approximate vibration level	Typical degree of perception
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

3.2 Structural damage

Currently, there is no Australian Standard that sets the criteria for assessment of buildings or other structural damage caused by vibration. Australian Standard 2436:2010 (R2016) – *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites;* does refer to the control of vibration in Section 4.8.1. The information in AS 2436 is general in nature and refers to other standards and guidelines if a more detailed assessment is required, i.e. quantification of vibration exposure. British Standard BS 7385.2:1993 – *Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Ground Borne Vibration* and British Standard BS 5228.2:2009 – *Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 2 Vibration*; are referenced in AS 2436 as being able to supply more detailed vibration quantification.

Additional to the detailed British Standards, the German Standard *DIN 4150-3: 1999 Structural Vibration – Part 3: Effects of Vibration on Structures* (German Standards, 1999) provides more stringent vibration criteria as opposed to BS7385.2:1993 for above ground structures, but less stringent criteria for below ground structures when compared to BS 5228.2:2009. Therefore as shown in Table 4, a combination of the German and British Standards is recommended, in the absence of specific criteria being supplied by the asset owner.

Table 1 of Section 5 of DIN 4150.3:1999 presents guideline values for the maximum absolute value of the velocity "*at the foundation and in the plane of the highest floor of various types of building. Experience has shown that if these values are compiled with, damage that reduces the serviceability of the building will not occur. If damage nevertheless occurs, it is to be assumed that other causes are responsible.*"

Measured values exceeding those listed in Table 4 "*… does not necessarily lead to damage; should they be significantly exceeded, however further investigations are necessary.*"

Table 4 Guidance values for short-term vibration on structures

Line	Type of structure	Guideline values for velocity v(t)[a] (mm/s)		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[b]
At grade structures (DIN 4150.3:1999)				
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	20	20 to 40	40 to 50
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10
Underground structures (BS 5228.2:2009)				
Competent structure such as steel or concrete pipeline		30		
Dilapidated brickwork		15		

[a] The term vi refers to vibration levels in any of the x, y or z axis..

[b] Where frequencies are above 100 Hz the values given in this column may be used as minimum values.

The vibration criteria related to structural damage exceed the human comfort criteria. Therefore, for facilities that people occupy the human comfort criteria should override the structural damage criteria for the assessment of any vibration.

3.3 Blasting Vibration Criteria

The Victorian State Government Department of Development, Jobs, Transport and Resources (DEDJTR) Earth Resources outlines blast limits in the environmental guideline *'Ground Vibration and Airblast Limits for Blasting in Mines and Quarries'* which is based on the Australian and New Zealand Environment and Conservation Council's *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration*, September 1990.

The purpose of the guideline is to set ground vibration and air blast limits such that annoyance at residential premises and other sensitive sites is minimised. It is noted that the guideline does not take into account levels that could give rise to damage of structures.

The guideline outlines two separate limits which apply depending upon whether the site was in operation prior to the introduction of the guideline (i.e. prior to 1 July 2001) or after the guideline was introduced. Applicable vibration and noise criteria are outlined in Table 5. It is noted that the ground vibration peak particle velocity (PPV) and airblast levels are generally measured at the nearest sensitive site to the blasting location.

Table 5 Recommended Ground Vibration and Airblast Levels

Type of site	Ground vibration	Airblast
Existing site	Below 10 mm/s ppv at all times	Below 120 dB (linear peak) at all times
New site	Below 5 mm/s ppv for 95% of all blasts	Below 115 dB (linear peak) for 95% of all blasts

Since blasting operations are not planned during operations for the Wimmera Project, the information above is included for information purposes only.

4. Baseline monitoring

4.1 Monitoring locations

Baseline continuous vibration monitoring was conducted at two locations between Friday 1 February 2019 to Thursday 21 February 2019 (Site 2) and between Friday 1 February 2019 to Saturday 23 February 2019 (Site 1) as summarised in Table 6. The vibration monitoring locations and setup at each location are shown in Figure 1 and presented in Appendix A, respectively. The monitoring sites were selected based on the following criteria:

- Within and/or close to the Indicative Project Extent
- Close to existing and potentially future transportation routes

Table 6 Vibration monitoring locations

Site ID	Easting	Northing	Location
Site 1 (R3)	583477.4	5910648.3	Residence located at 2432 Natimuk-Hamilton Road
Site 2 (R5)	585811.2	5915116.6	Residence located at 66 Nurrabiel Church Road

4.2 Instrumentation

An Instantel™ Micromate ® vibration monitors with tri-axial geophones were installed to measure the ambient vibration levels at the monitoring locations. The details of the vibration monitor used is provided in Table 7.

Table 7 Vibration monitoring instrumentation

Logging Locations (refer to Table 6)	Site 1	Site 2
Type/Model	Instantel Micromate®	Instantel Micromate®
Serial Number	UM10469	UM10468
Operating range	0.00788 mm/s – 254 mm/s	
Start Date (time)	01/02/2019 (15:00)	01/02/2019 (19:00)
Finish Date (time)	23/02/2019 (18:30)	21/02/2019 (15:00)
Measurement Time Interval	10 seconds	10 seconds

4.3 Methodology

Peak Particle Velocity (PPV) vibration levels were measured in 10 second intervals and in tri-axial directions (i.e. longitudinal, transverse and vertical) at each monitoring location. The geophones were mounted 10 cm below ground level using ground spikes to set the sensor firmly into the ground. The area around the geophone was then backfilled and lightly compacted allowing for good coupling of the vibration geophone with the ground as shown in figures in Appendix A.

It is not expected that meteorological conditions will affect the background levels. However data acquired during periods of precipitation was not included into analysis.

4.4 Results

The baseline vibration levels measured at monitoring locations are summarised in Appendix B and Table 8. The data in Appendix B represent maximum Peak Particle Velocities (PPVs) during 15 min periods. The measured short term vibration levels were analysed and seven isolated events were identified across two sites as extraneous (non-background) vibration which were excluded from the analysis of results. These periods are highlighted in the vibration result graphs presented in Appendix B.

Minimum through maximum vibration levels of approximately 0.05 – 0.29 mm/s were measured at the site which are at or below the recommended human comfort vibration targets at residential premises and typical threshold of perception, however this includes both minimum and maximum values. On average values ranged from 0.06 to 0.15 mm/s across both sites which is below both the day and night time preferred PPV criteria for a residential premise outlined in Table 2 (criteria ranges from 0.2 to 0.28 mm/s). Based on the measured baseline vibration levels, adoption of human comfort vibration criteria as outlined in Section 3 is considered appropriate for new industrial developments.

Table 8 Summary of measured vibration levels

Statistical Descriptor	Highest of tri-axial PPV vibration levels mm/s	
	Site 1	Site 2
Maximum ambient	0.221 mm/s (221 µm/s)	0.292 mm/s (292 µm/s)
90th percentile (level exceeded 10 % of the time)	0.150 mm/s (150 µm/s)	0.118 mm/s (118 µm/s)
Average	0.102 mm/s (102 µm/s)	0.085 mm/s (85 µm/s)
10th percentile (level exceeded 90 % of the time)	0.063 mm/s (63 µm/s)	0.063 mm/s (63 µm/s)
Minimum	0.047 mm/s (47 µm/s)	0.047 mm/s (47 µm/s)

5. Conclusion

GHD was engaged by Iluka to prepare a baseline vibration assessment for the proposed WIM100 mine site. Baseline vibration monitoring was conducted at two locations inside the Indicative Project Extent during the period 1 February 2019 to 23 February 2019.

Relevant vibration sensitive receivers that could potentially be affected by vibration levels from the operation of the proposed mine were identified.

Applicable and recommended vibration criteria were discussed addressing the following relevant vibration impacts:

- Human comfort vibration levels
- Prevention of structural damage
- Blasting ground borne vibration limits (for information only)

The results of the vibration monitoring indicated that a typical baseline vibration level ranged from 0.06 to 0.15 mm/s across both sites which is below the recommended human comfort vibration targets at residential premises and also below the typical threshold of human perception.

Based on the measured baseline vibration levels, adoption of relevant vibration criteria as outlined in Section 3 of this report is considered appropriate for the proposed Wimmera Project.

This Report is subject to, and must be read in conjunction with, the limitations set out in section 1.5 and the assumptions and qualifications contained throughout the Report.

Appendices

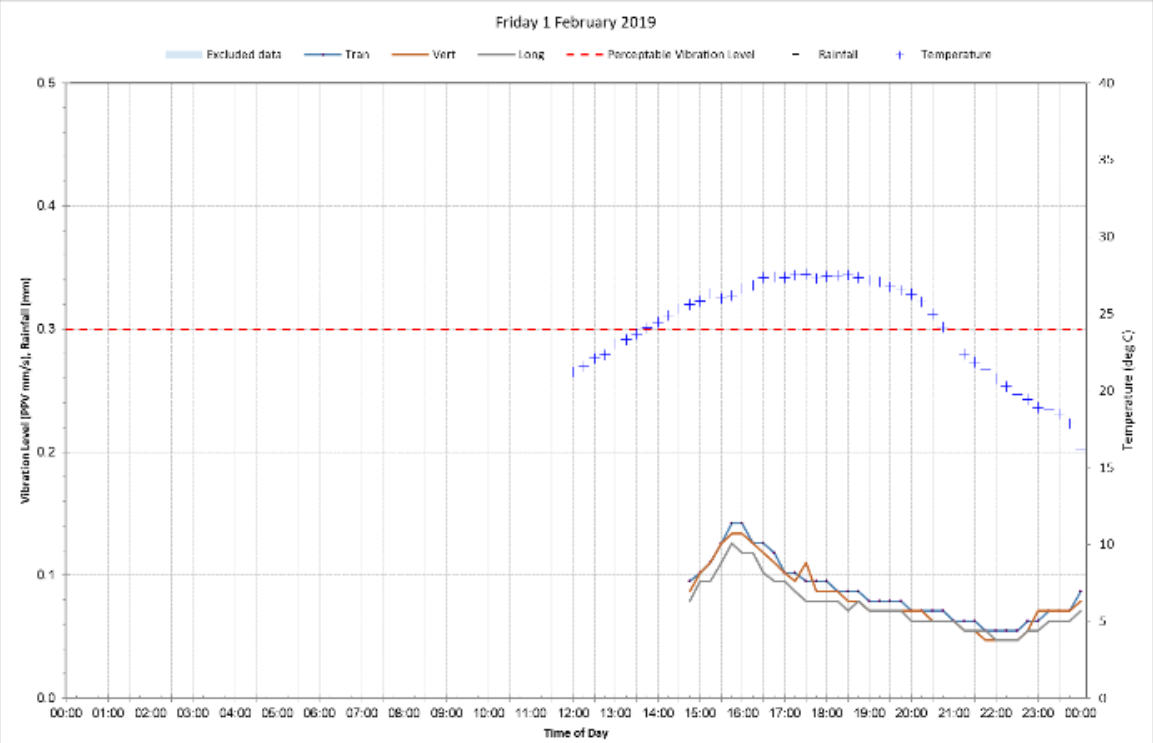
Appendix A – Vibration monitoring equipment installation

Site 1 - Residence located off Natimuk-Hamilton-Natimuk Road

Site 2 - Residence located at 66 Nurrabiel Church Road

Appendix B – Vibration monitoring results

Site 1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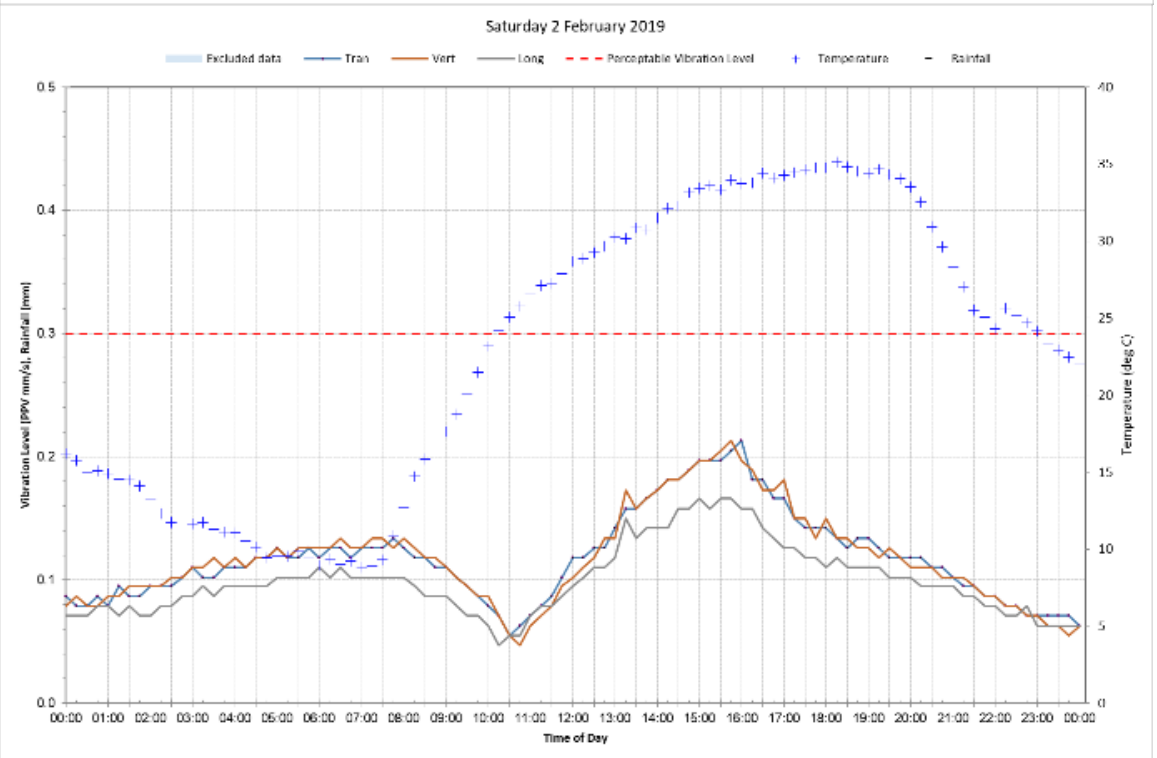
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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Temperature
Rainfall
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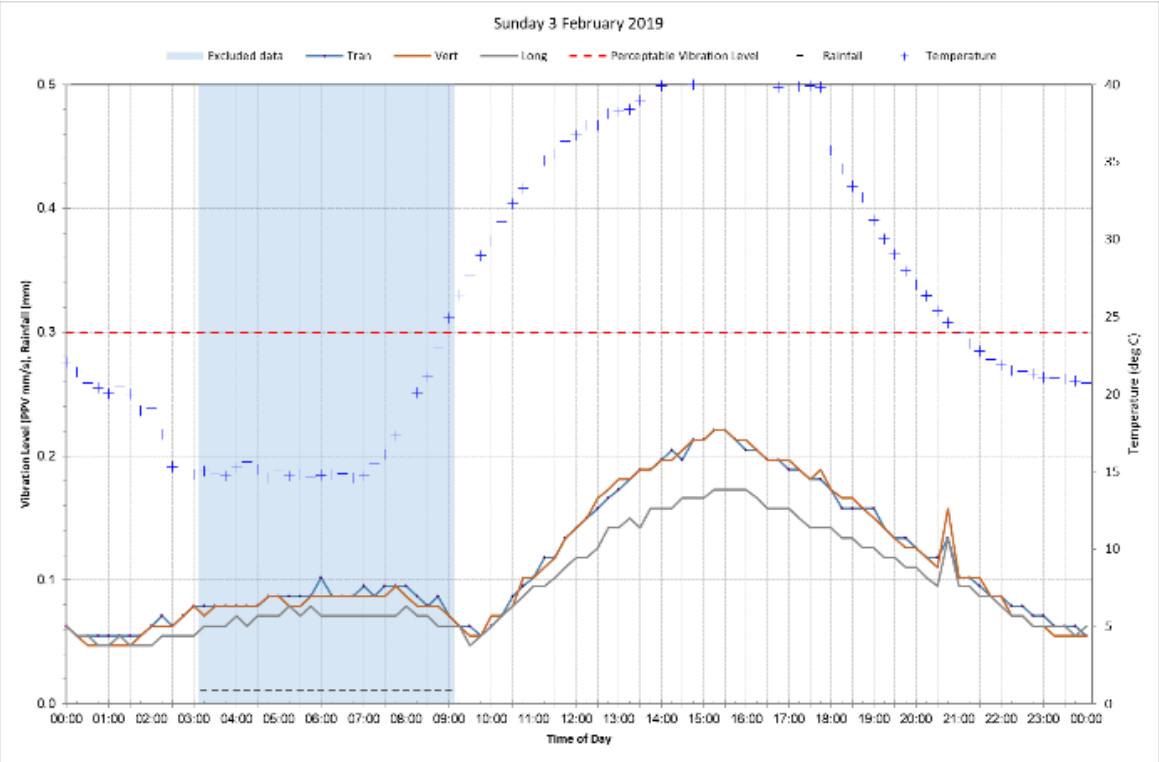
Temperature (deg C)
Time of Day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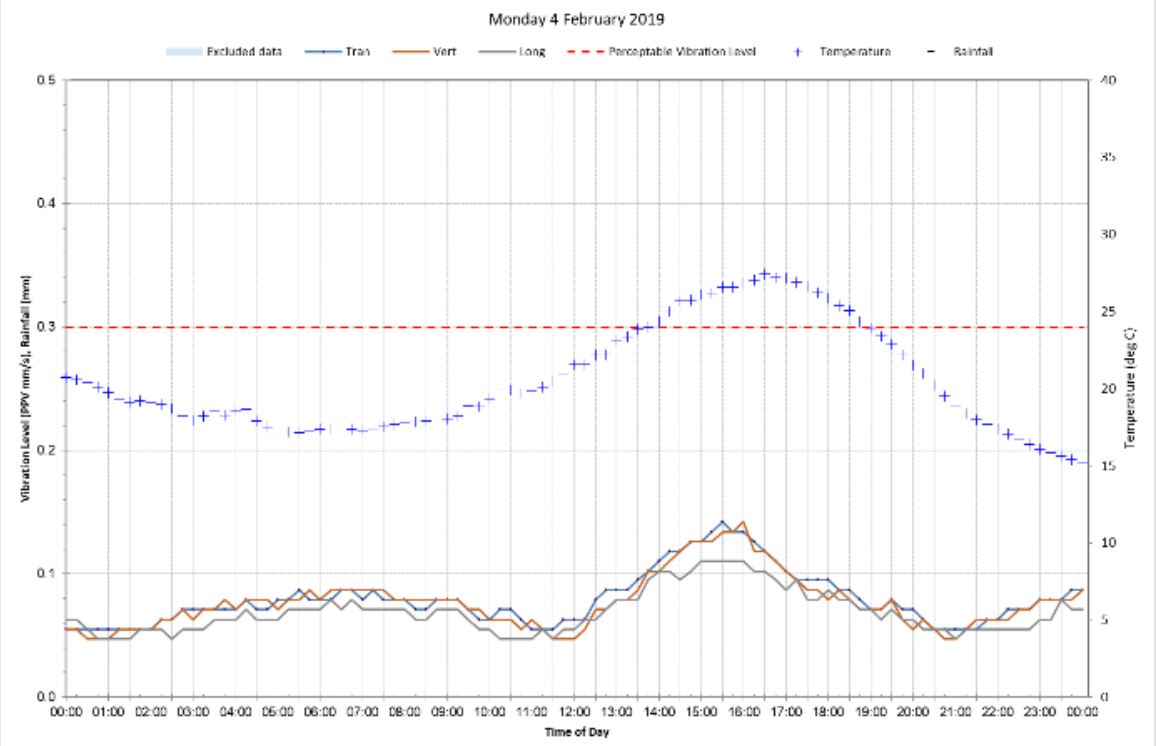
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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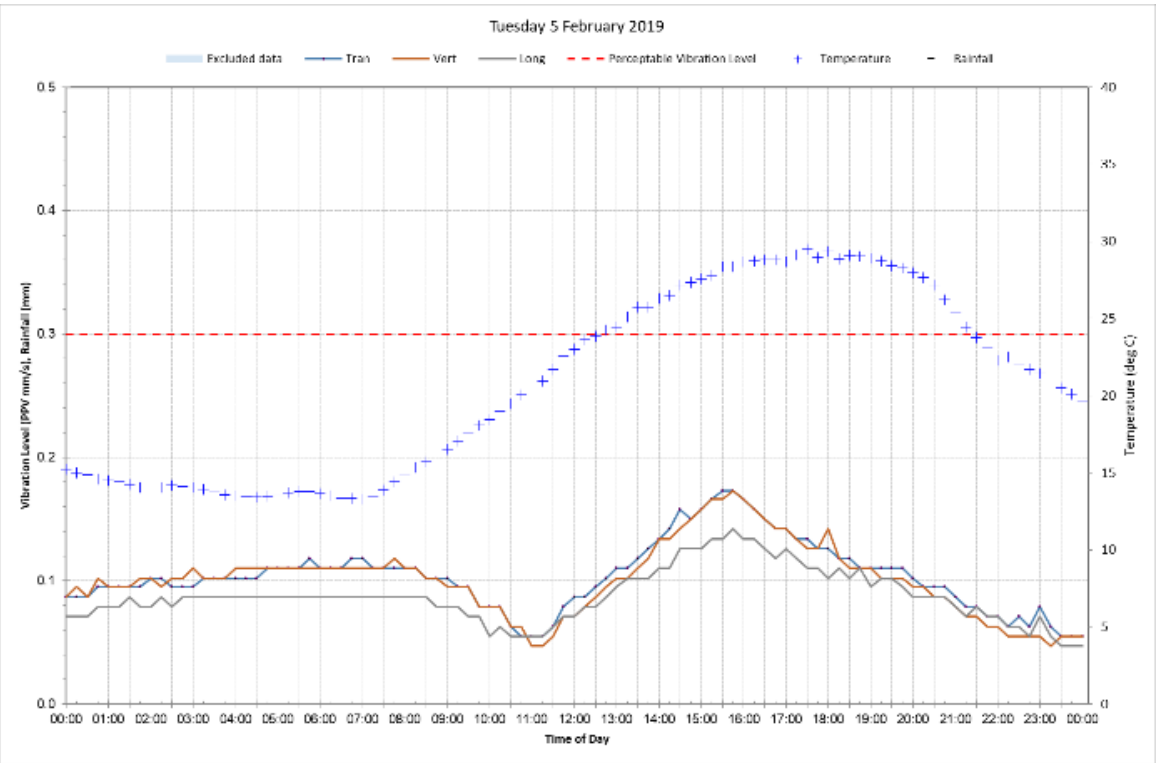
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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Vert
Long
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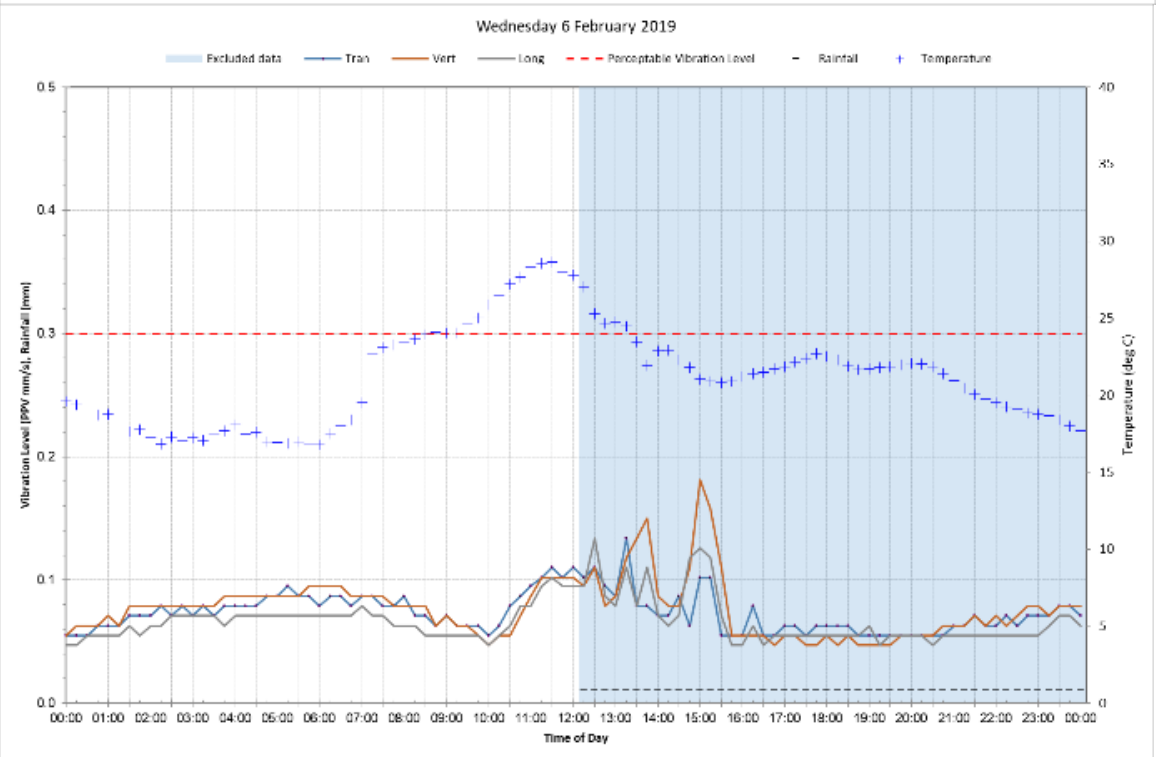
Temperature
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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Vert
Long
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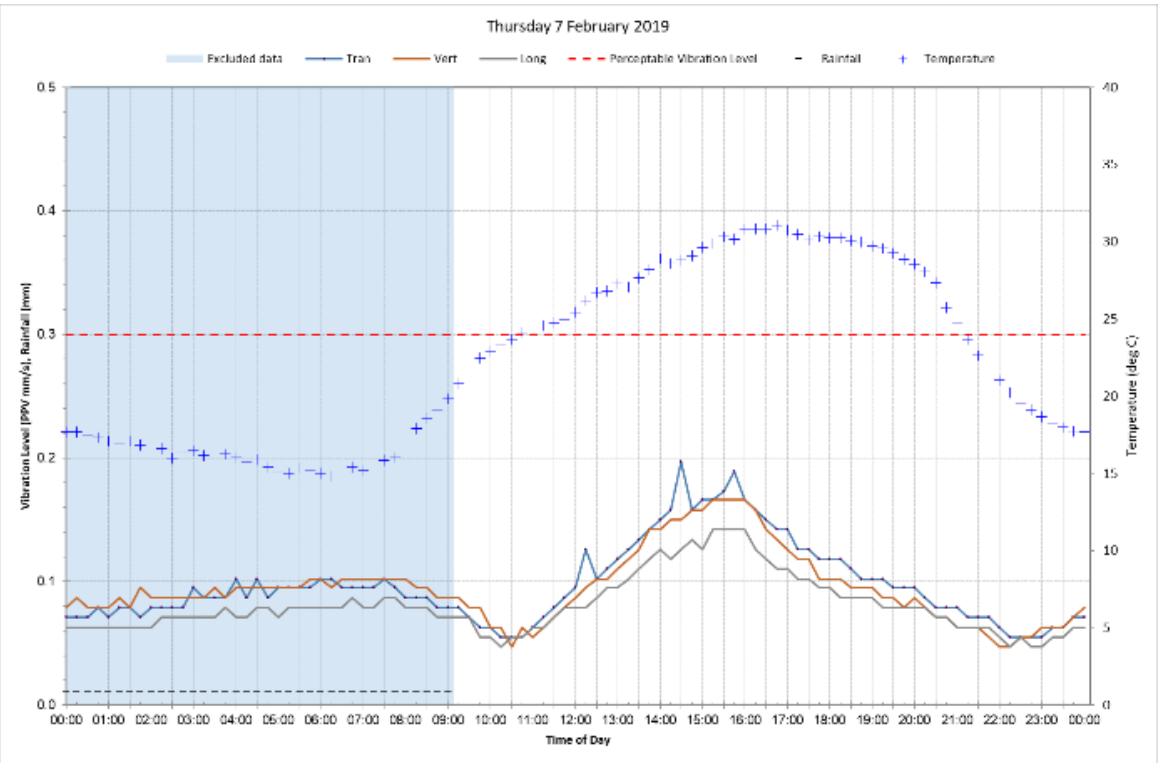
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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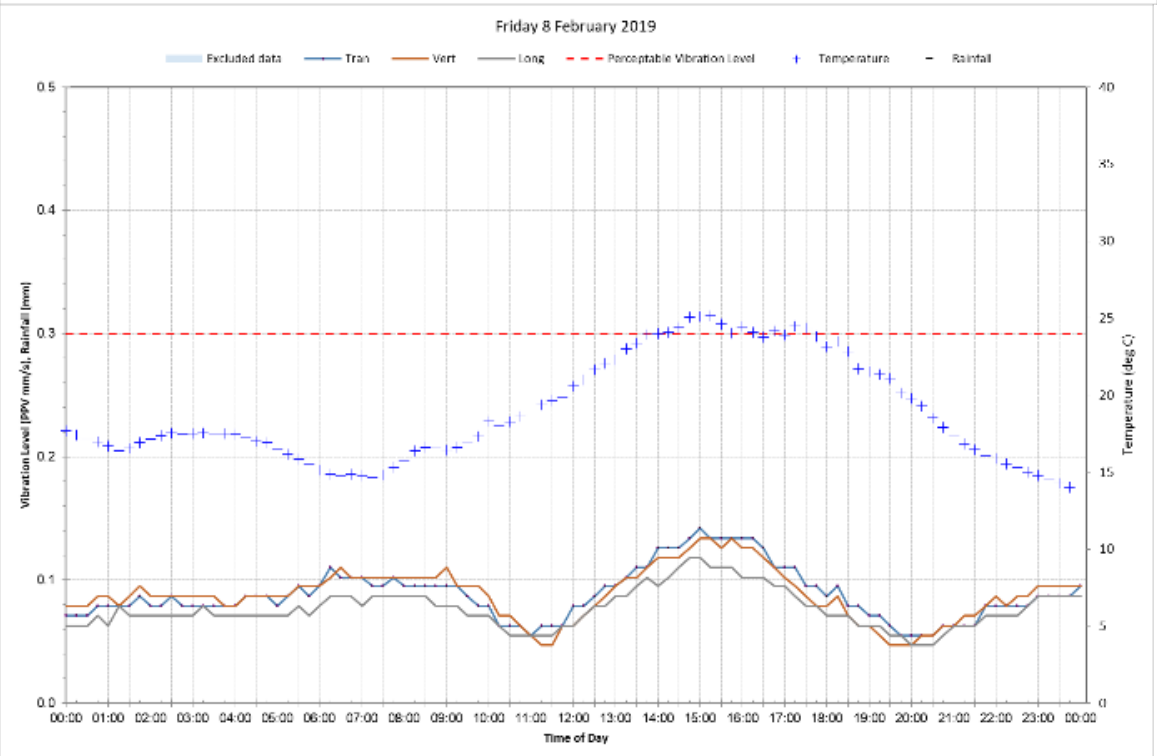
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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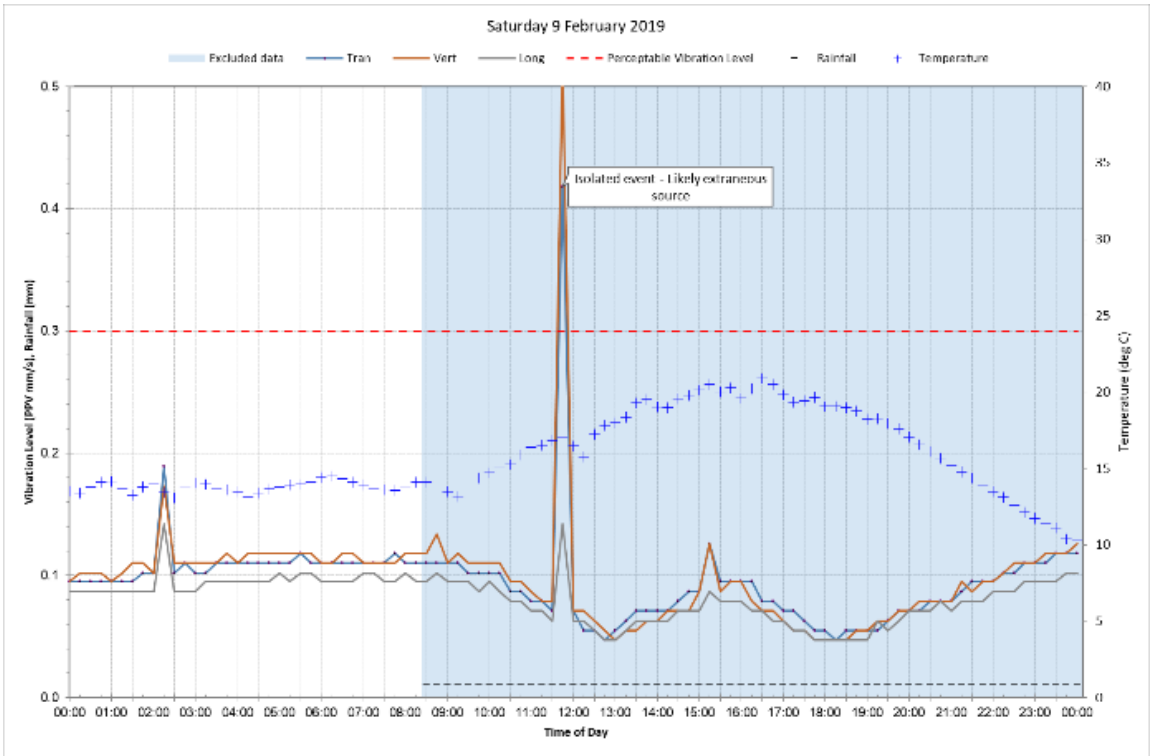
Temperature
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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Rainfall
Temperature
Isolated event - Likely extraneous source
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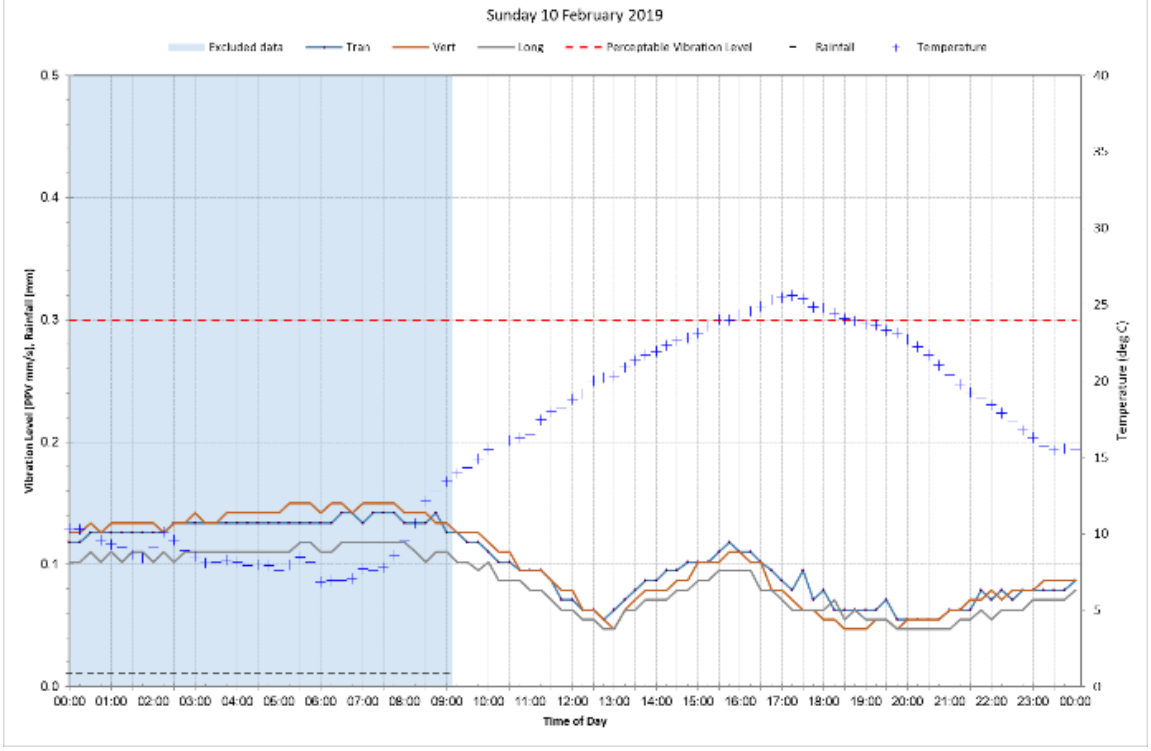
Temperature (deg C)
Time of Day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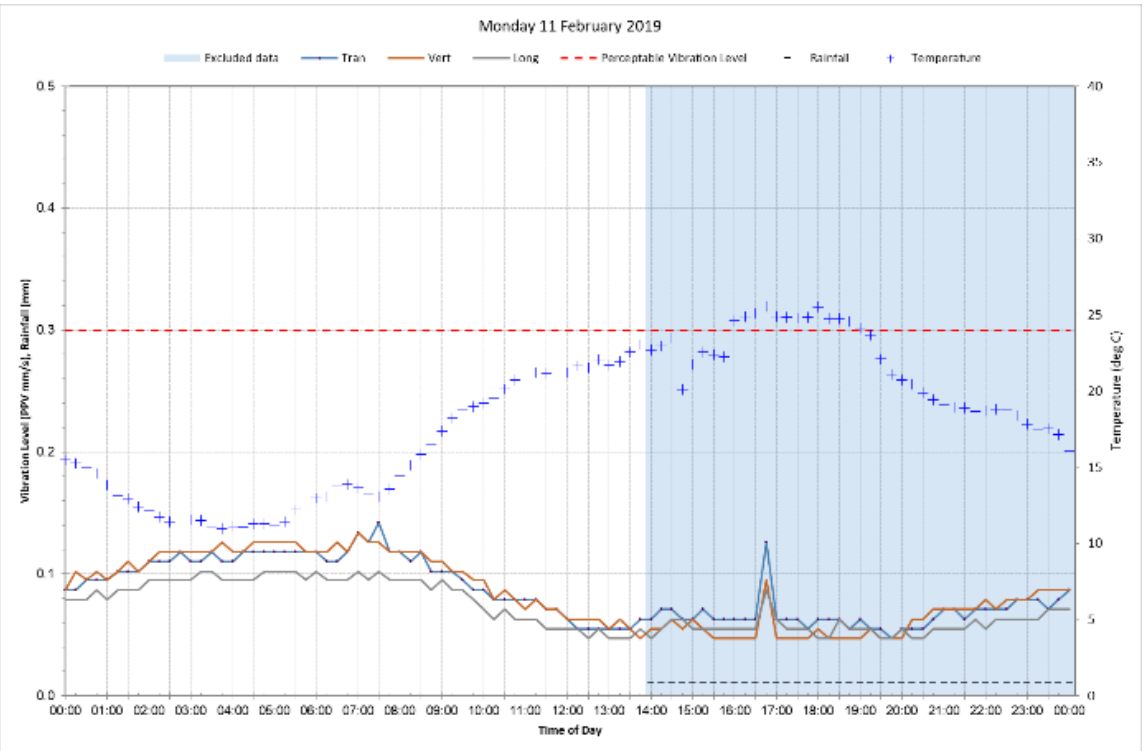
Temperature (deg C)
Time of Day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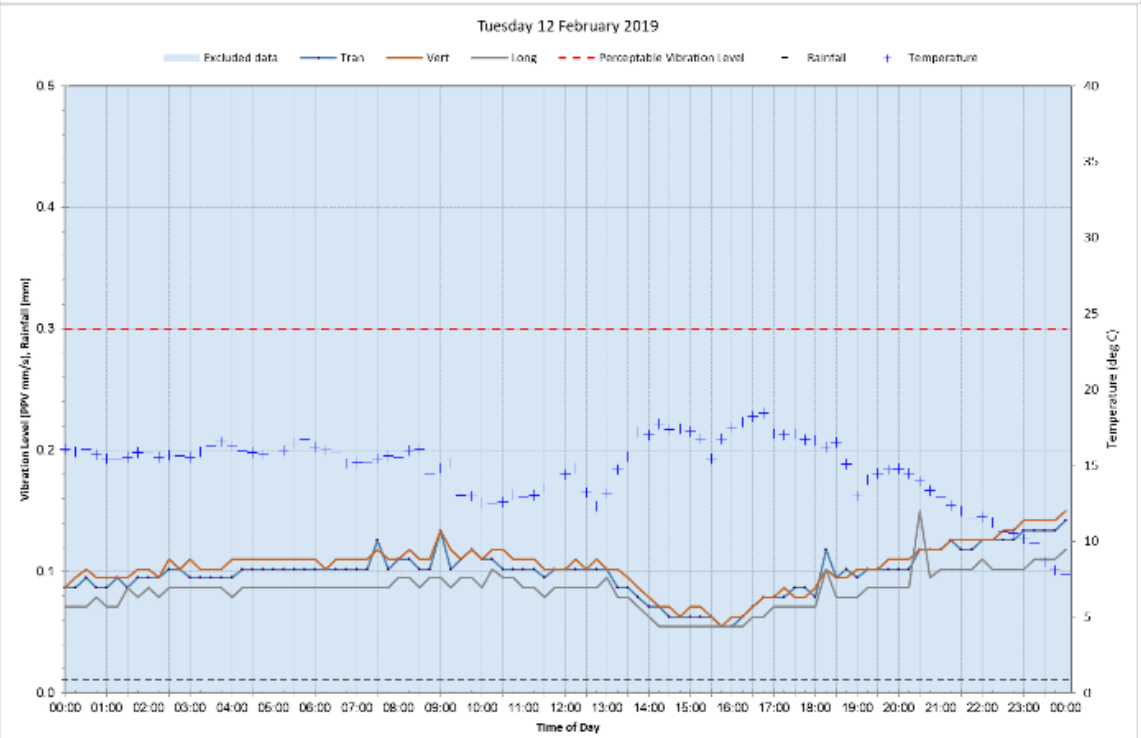
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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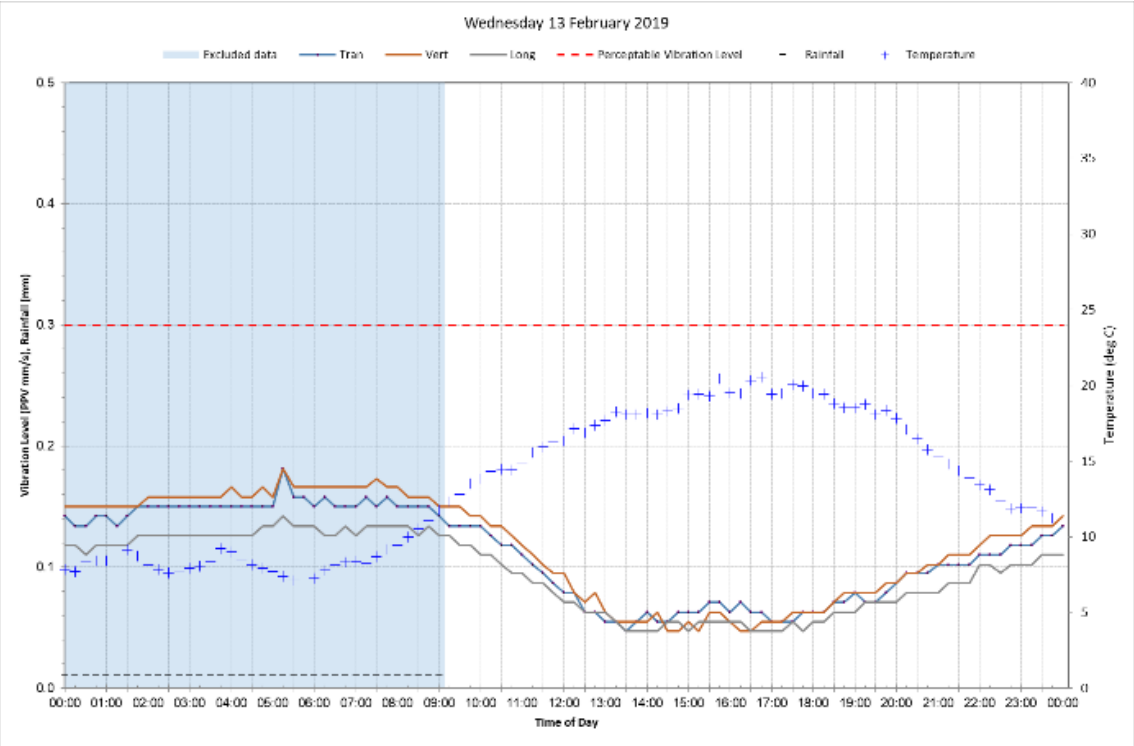
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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Excluded data
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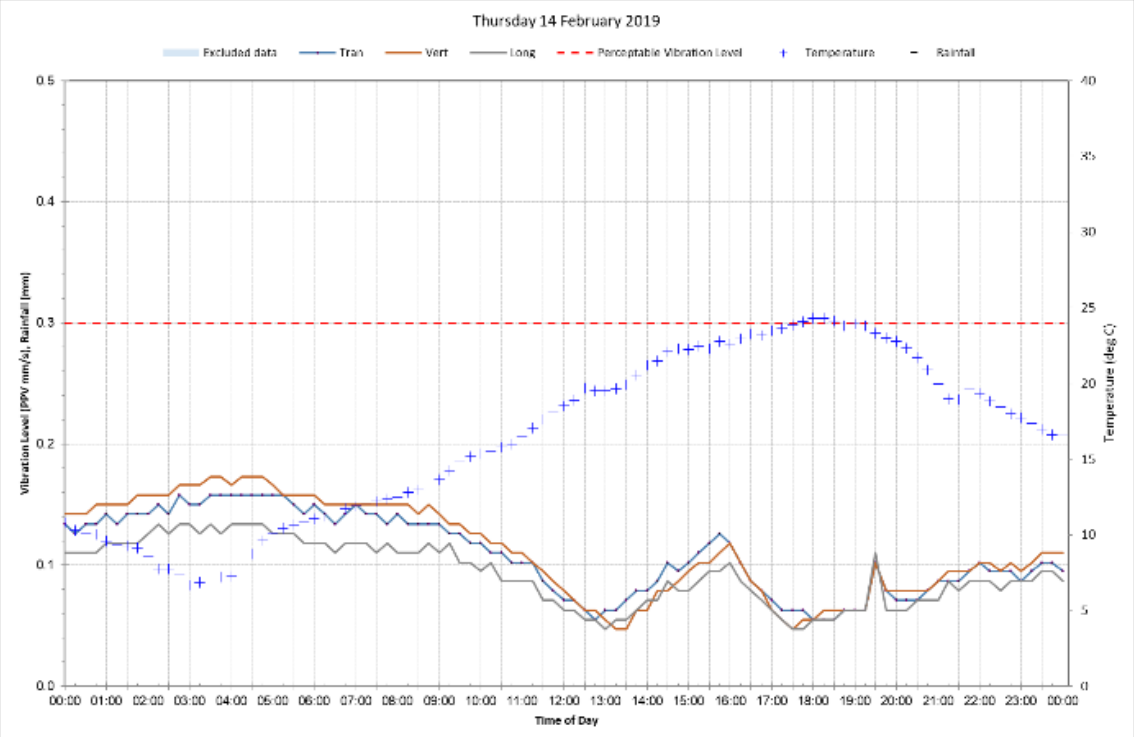
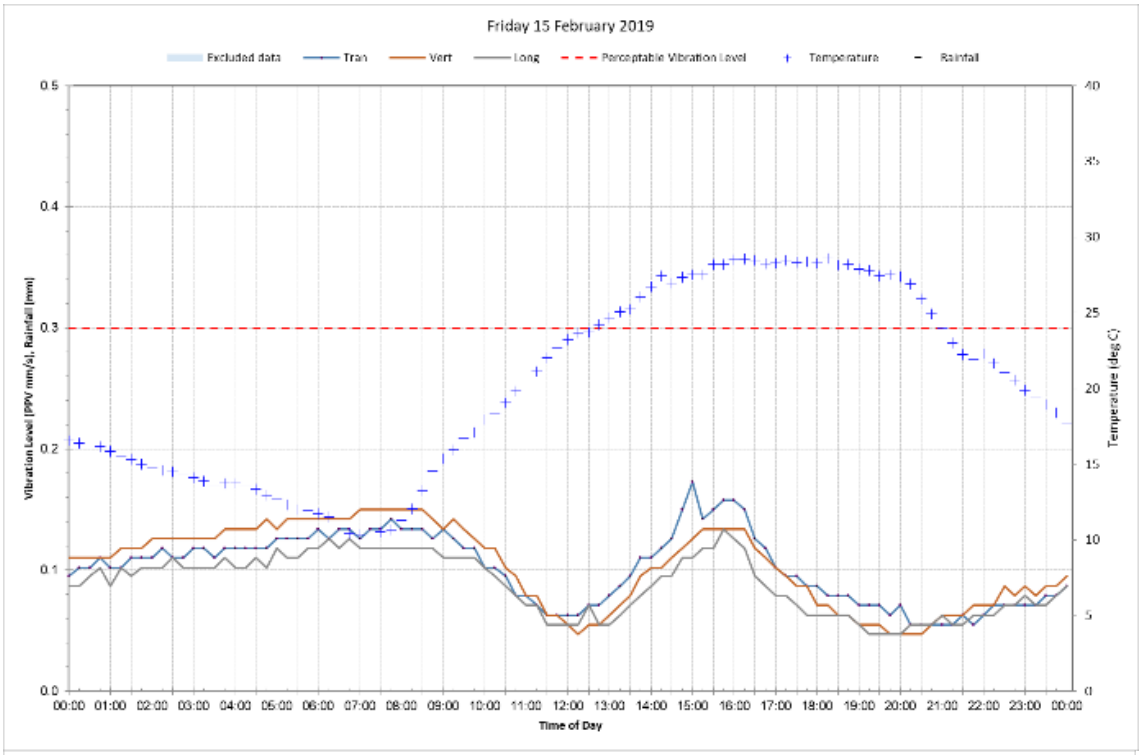
Vert
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day


Thursday 14 February 2019
Excluded data
Tran
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day


Friday 15 February 2019
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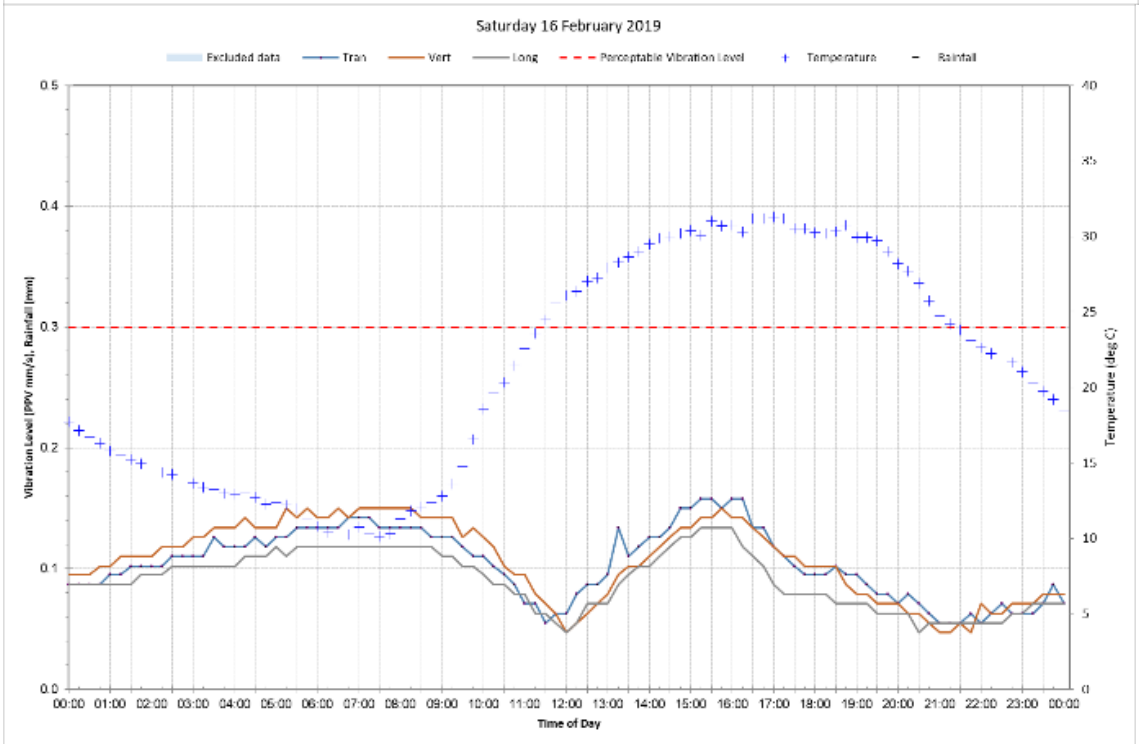
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day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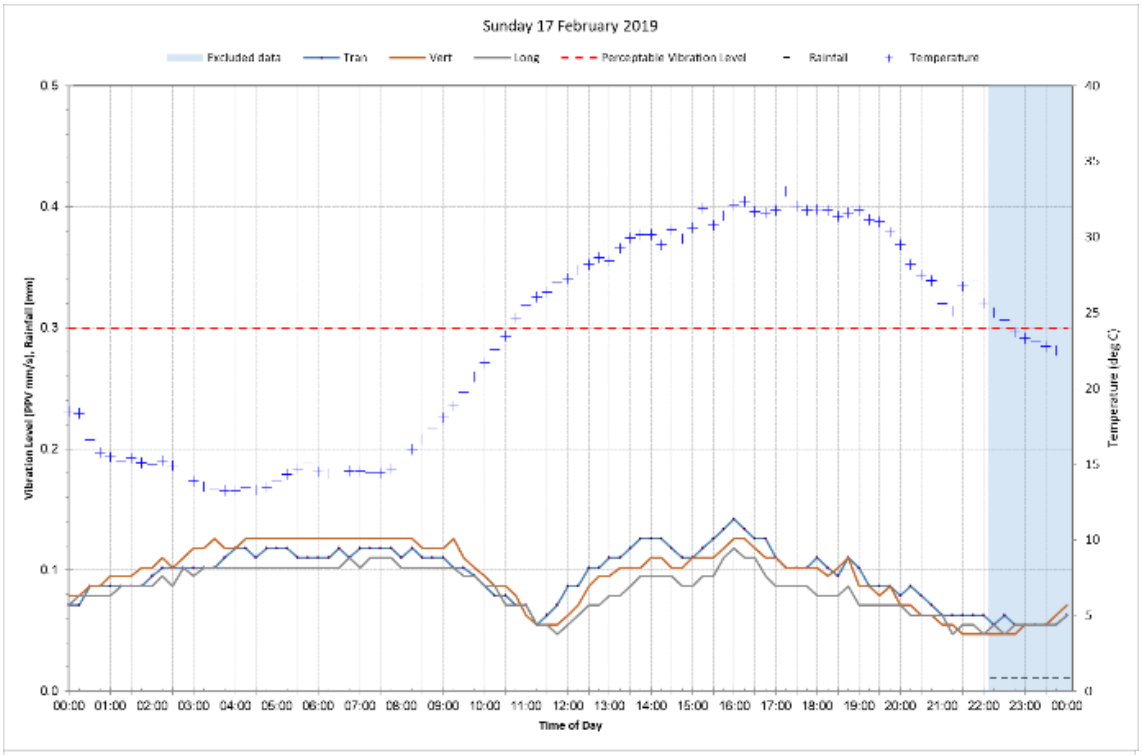
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day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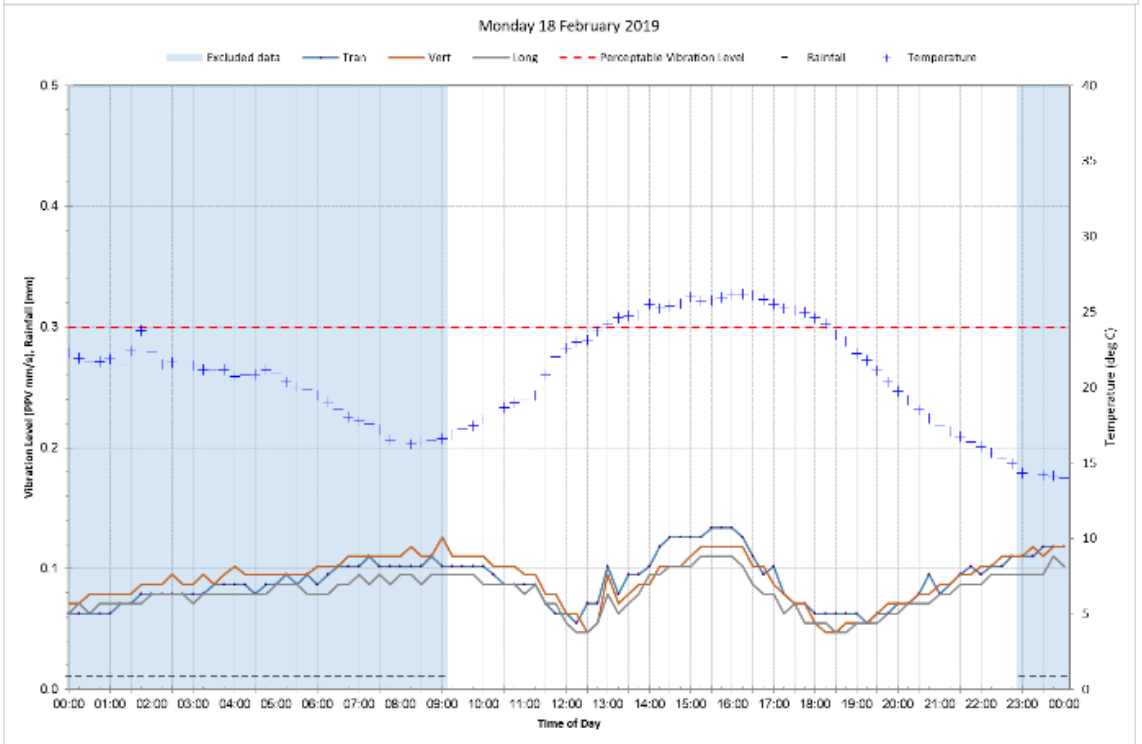
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day


Monday 18 February 2019
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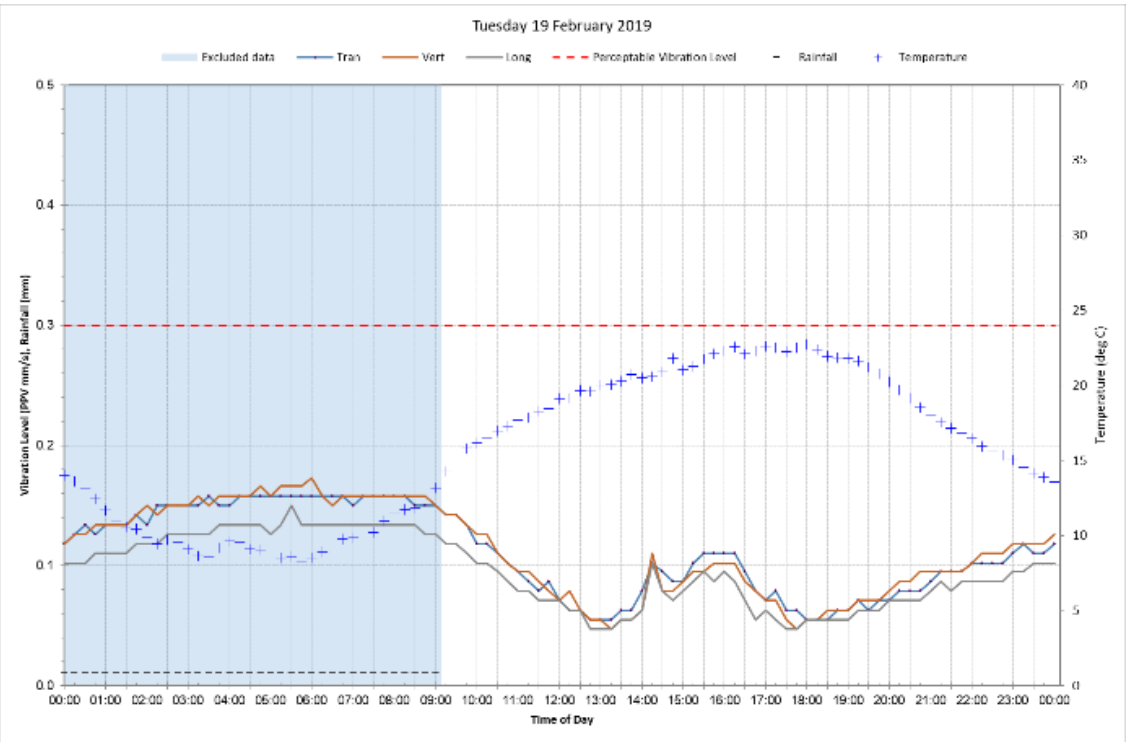
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day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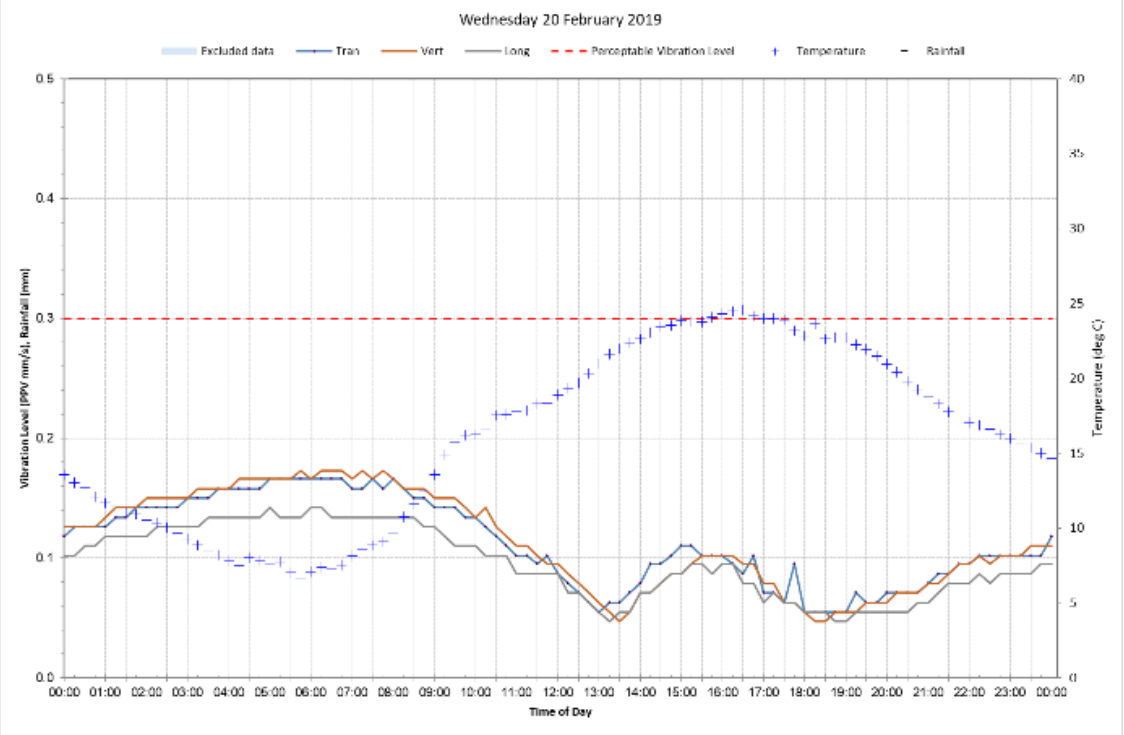
Vert
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day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Vert
Long
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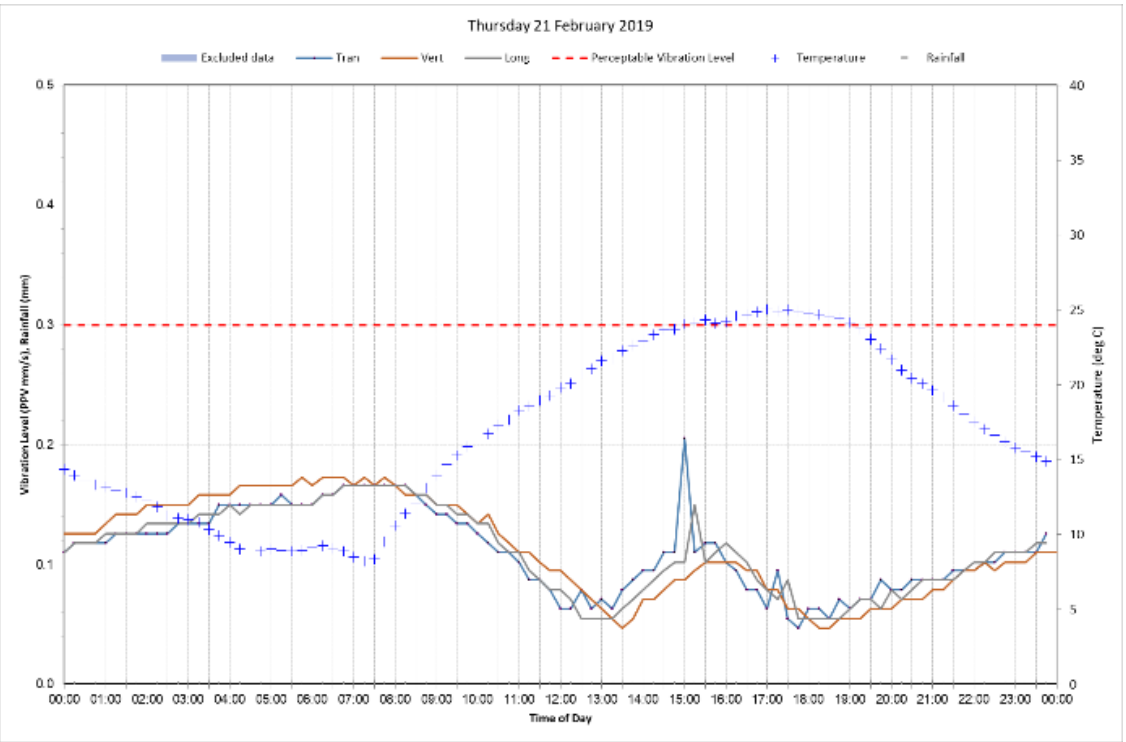
Temperature
Rainfall
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day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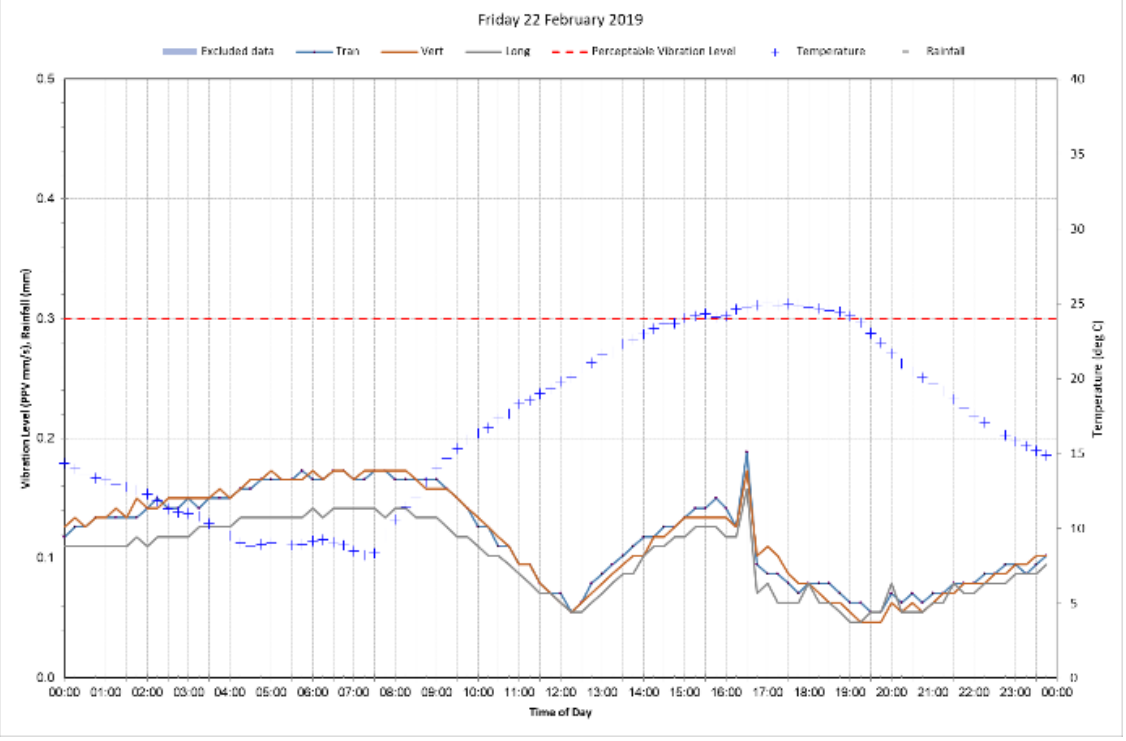
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day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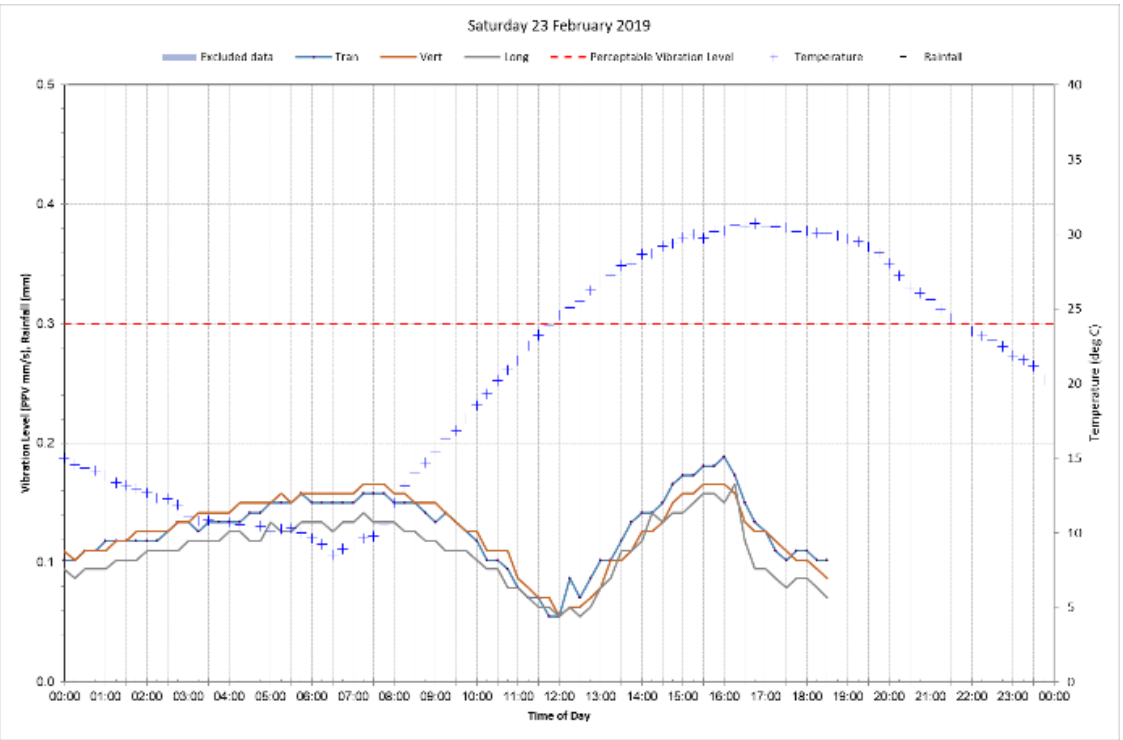
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day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Tran
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day
0.0
0.1
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0.3
0.4
0.5
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40
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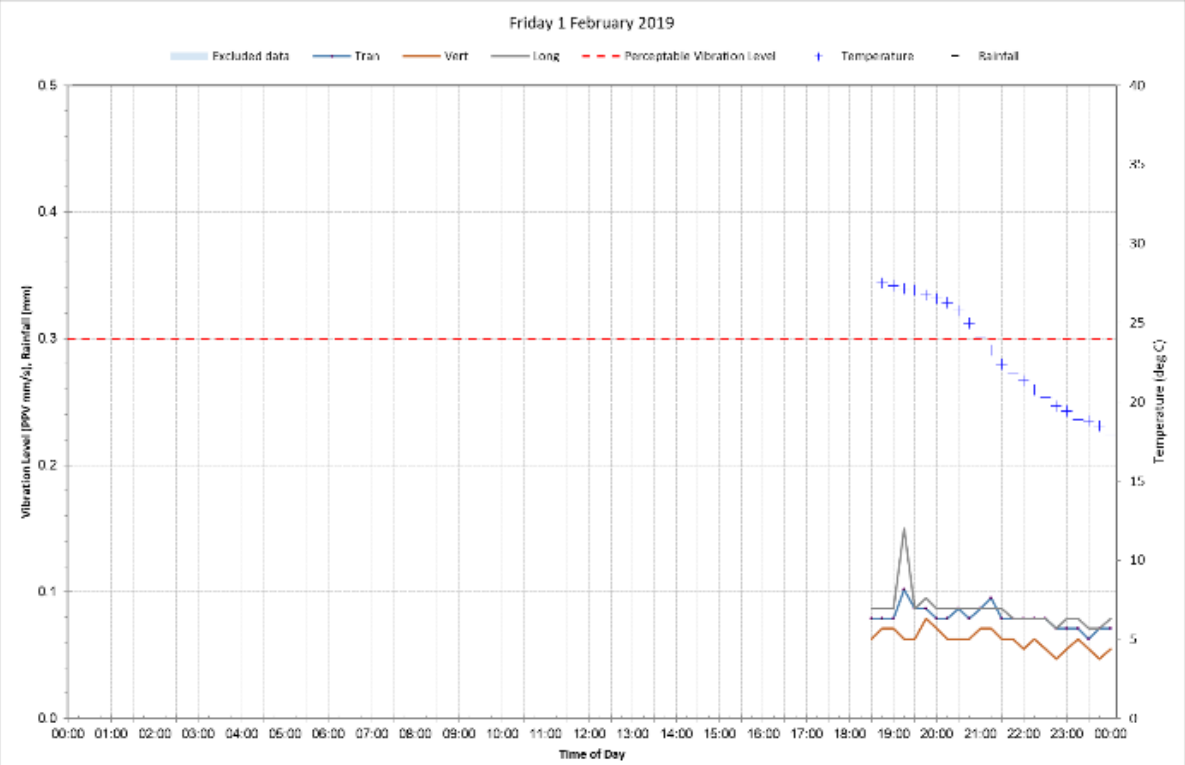
Site 2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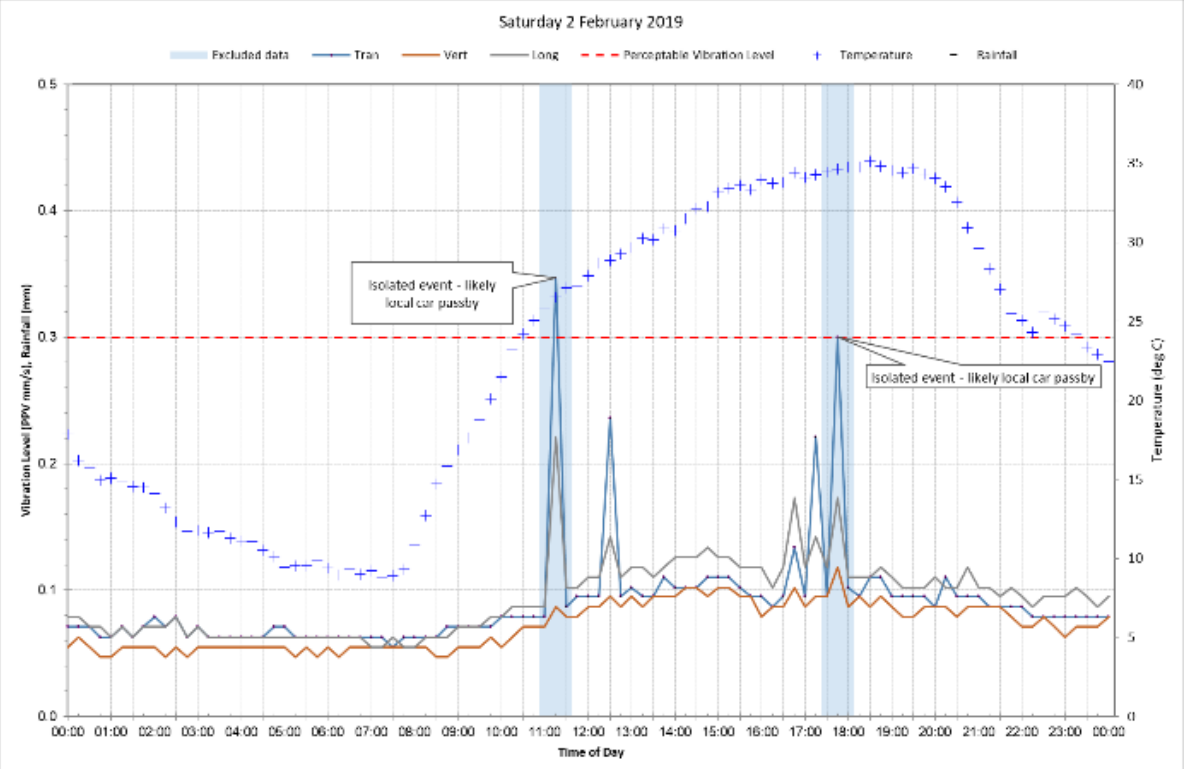
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day


Saturday 2 February 2019
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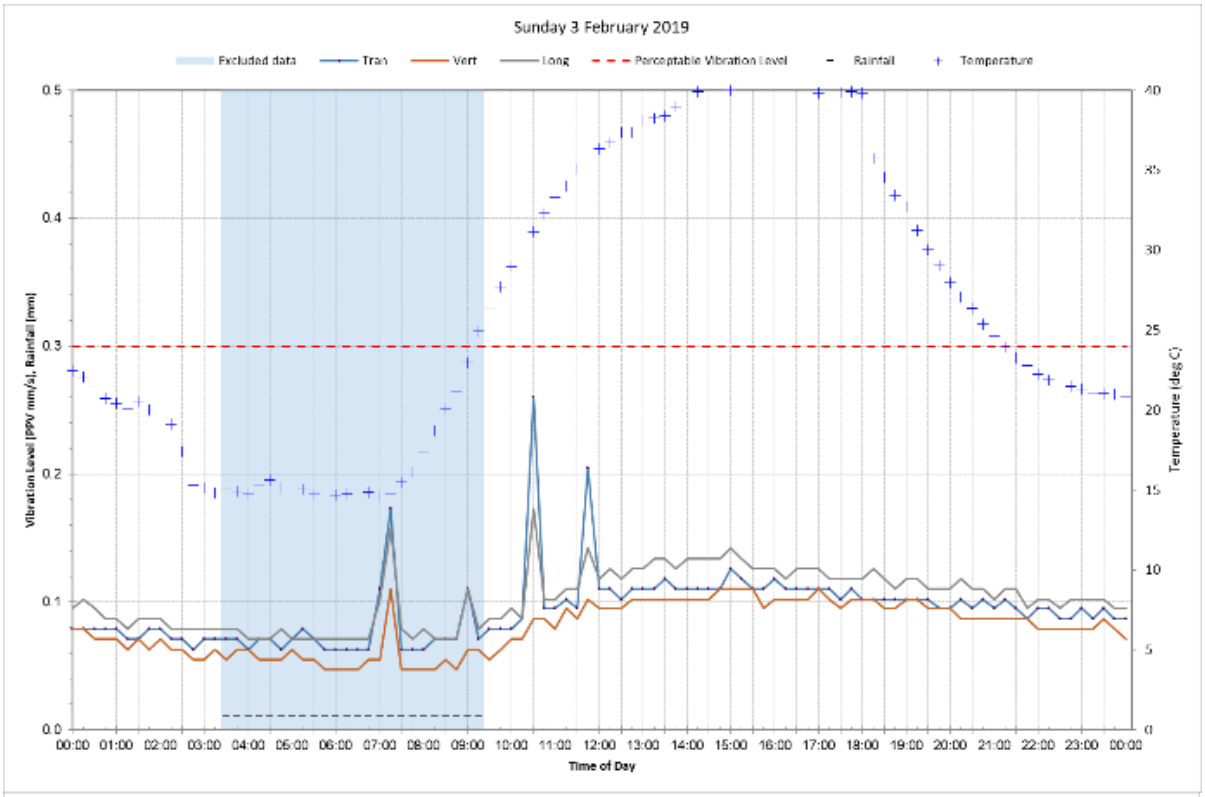
Tran
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Isolated event - likely local car passby
Isolated event - likely local car passby
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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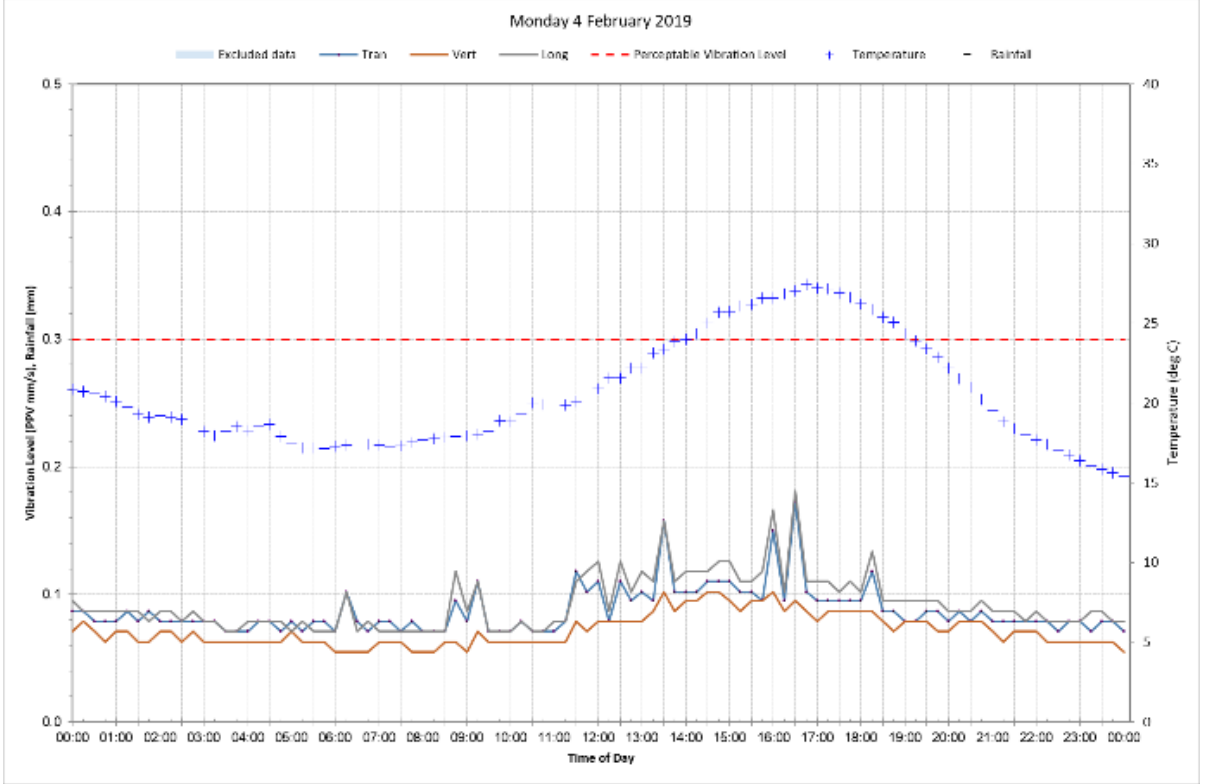
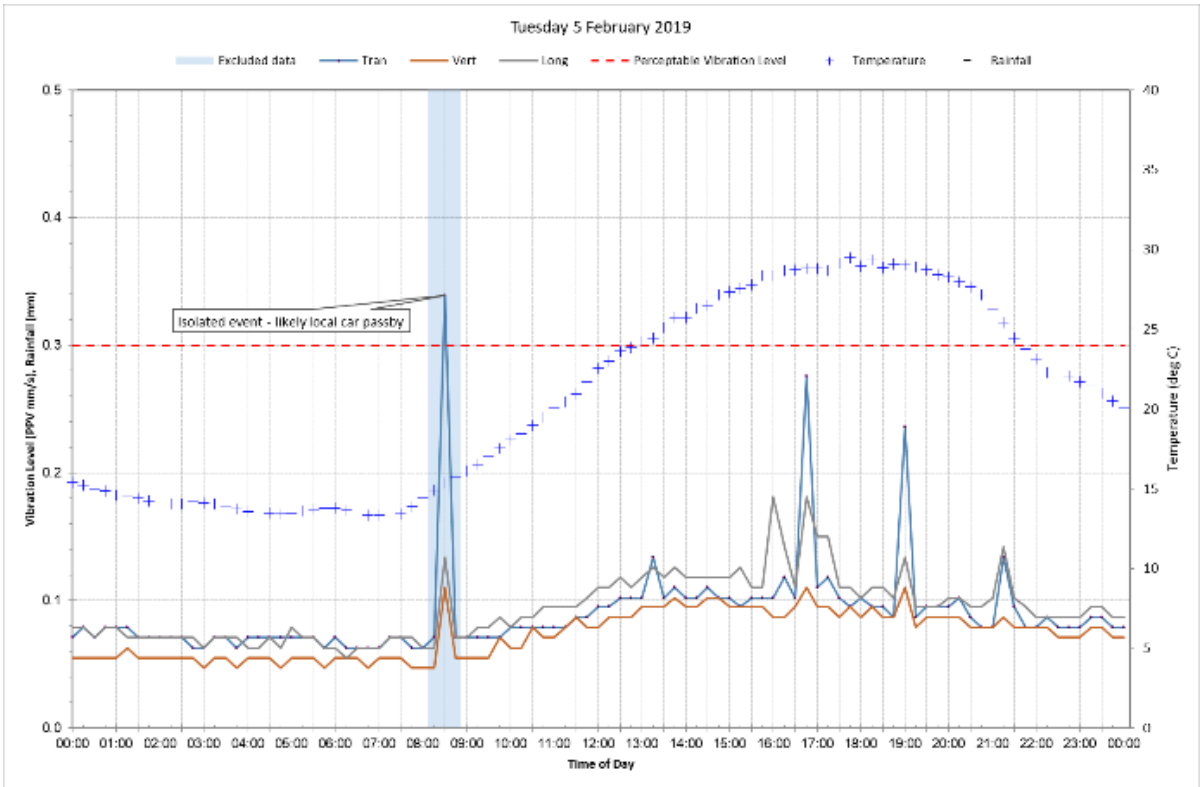
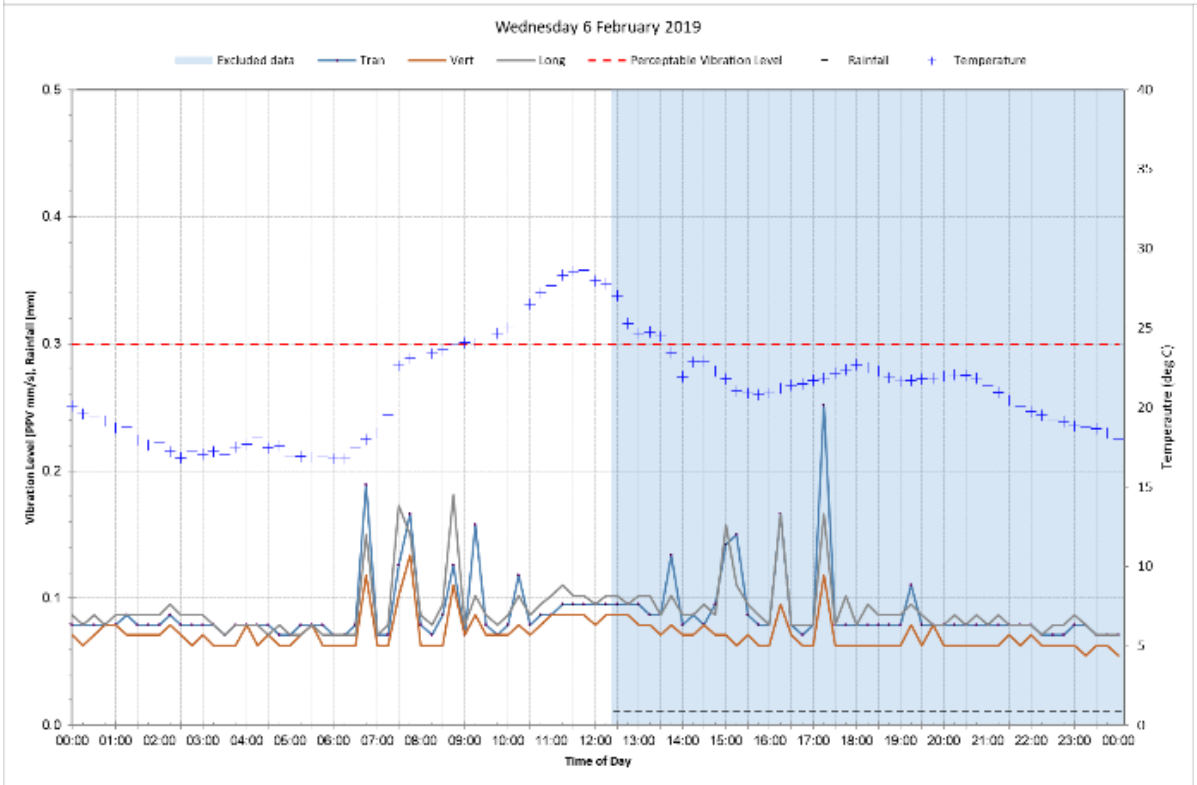
Vert
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day


Monday 4 February 2019
Excluded data
Tran
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day


Tuesday 5 February 2019
Excluded data
Tran
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Isolated event - likely local car passby
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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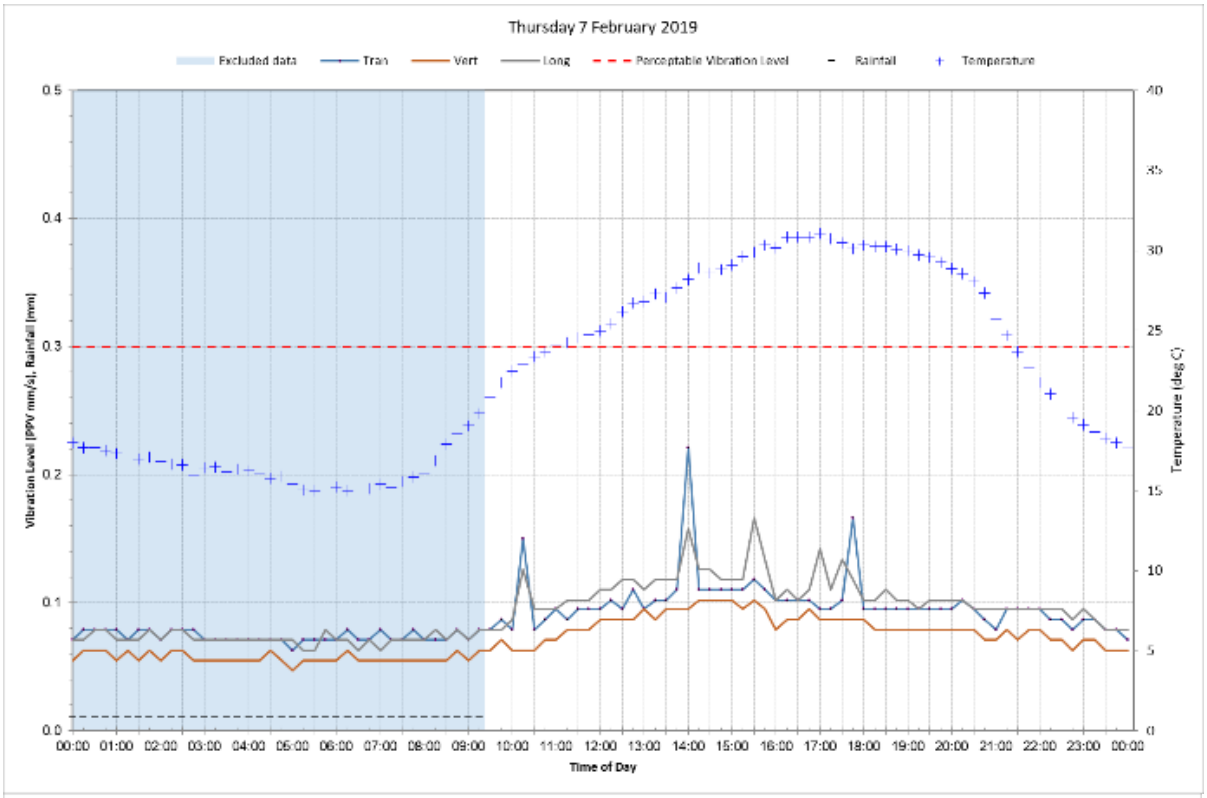
Tran
Vert
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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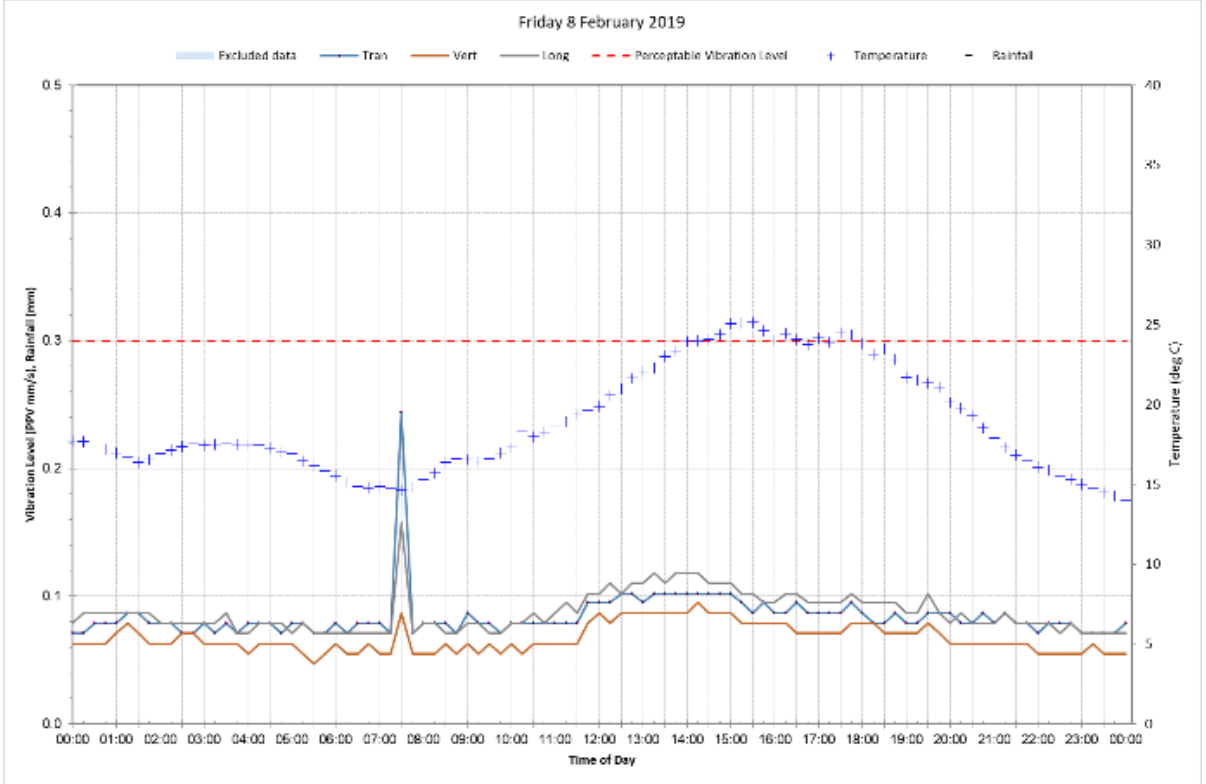
Vert
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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Long
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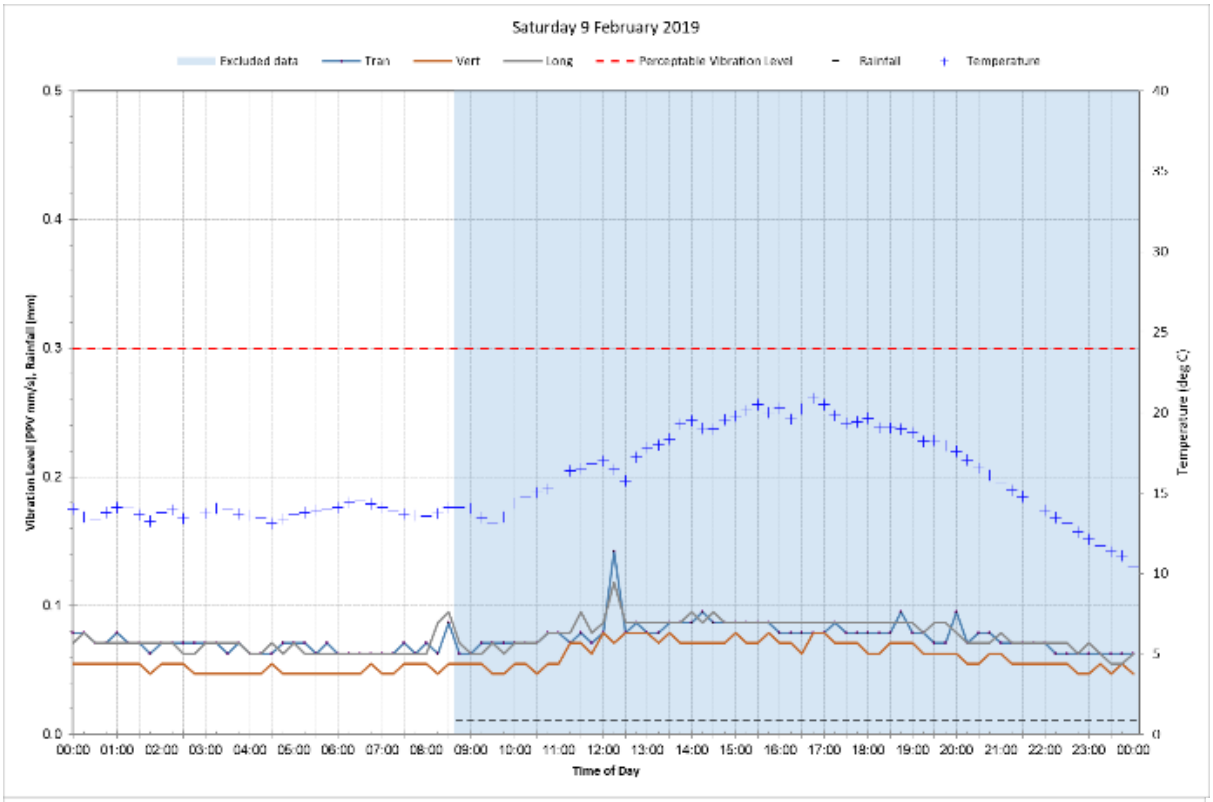
Temperature
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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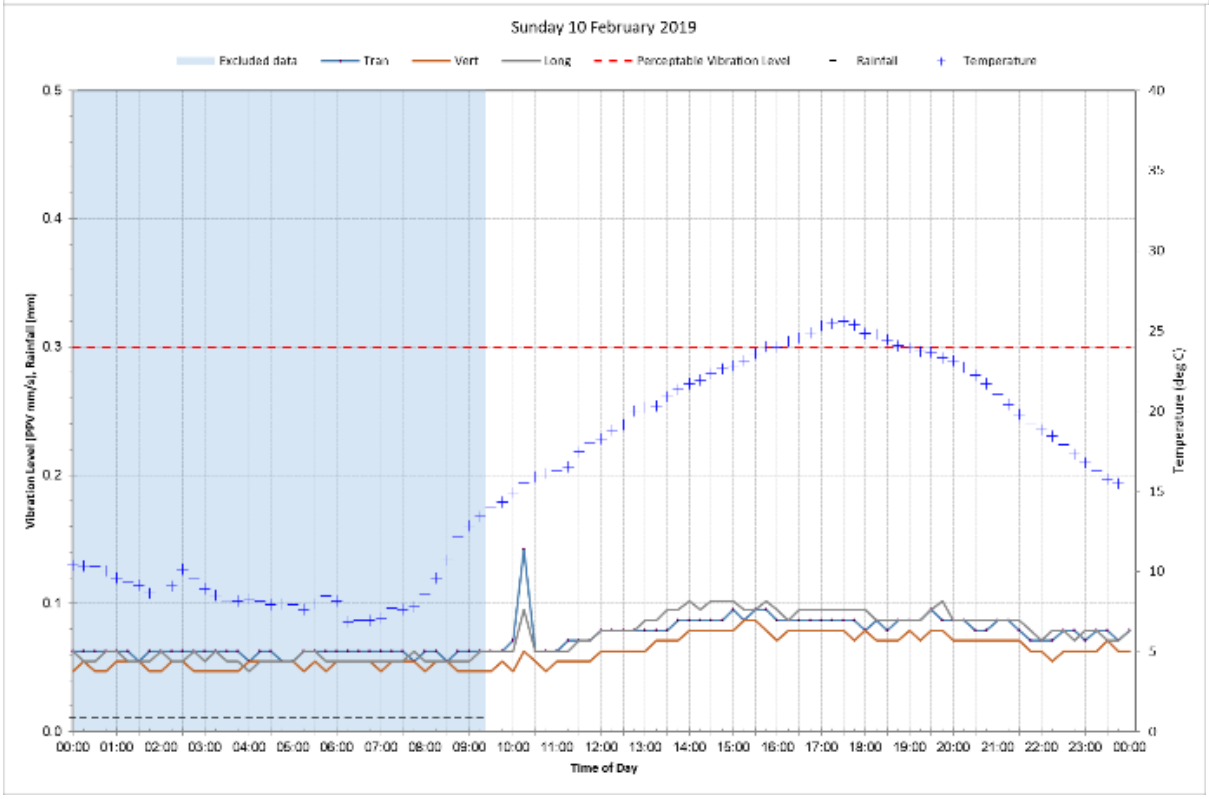
Vert
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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Vert
Long
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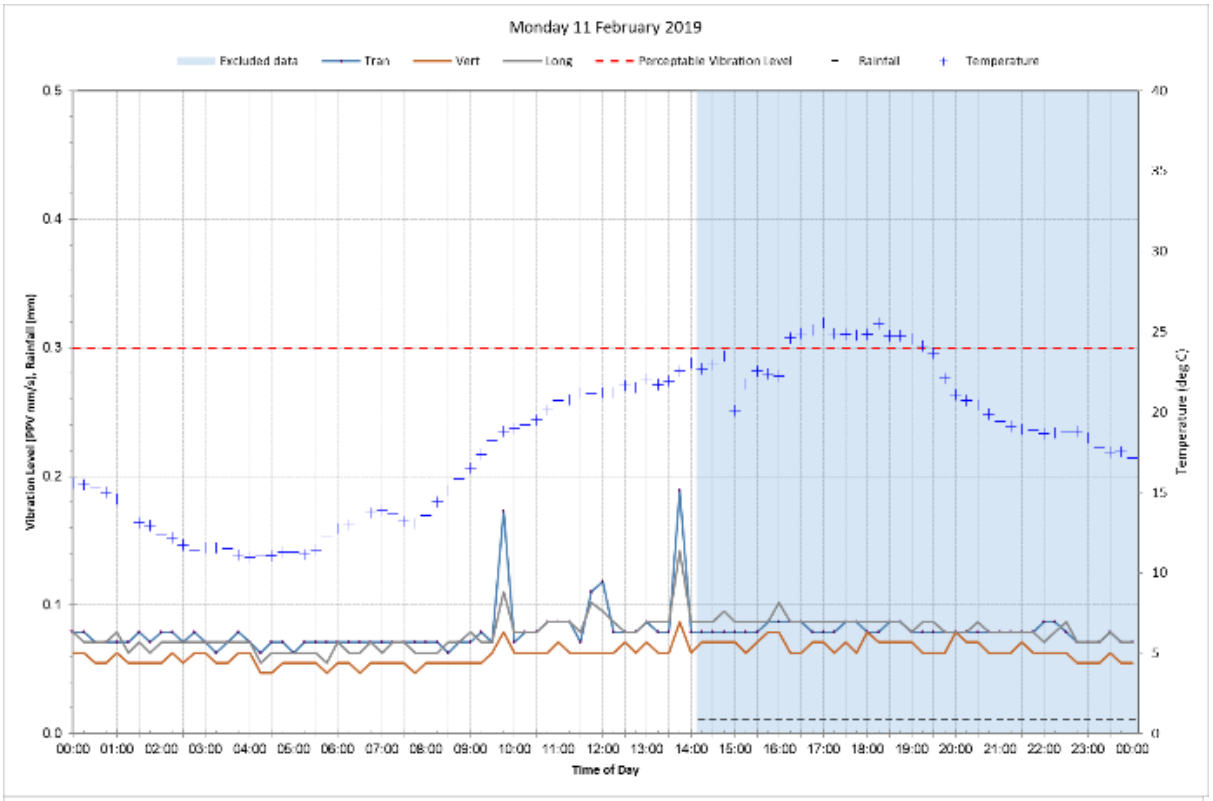
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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Vert
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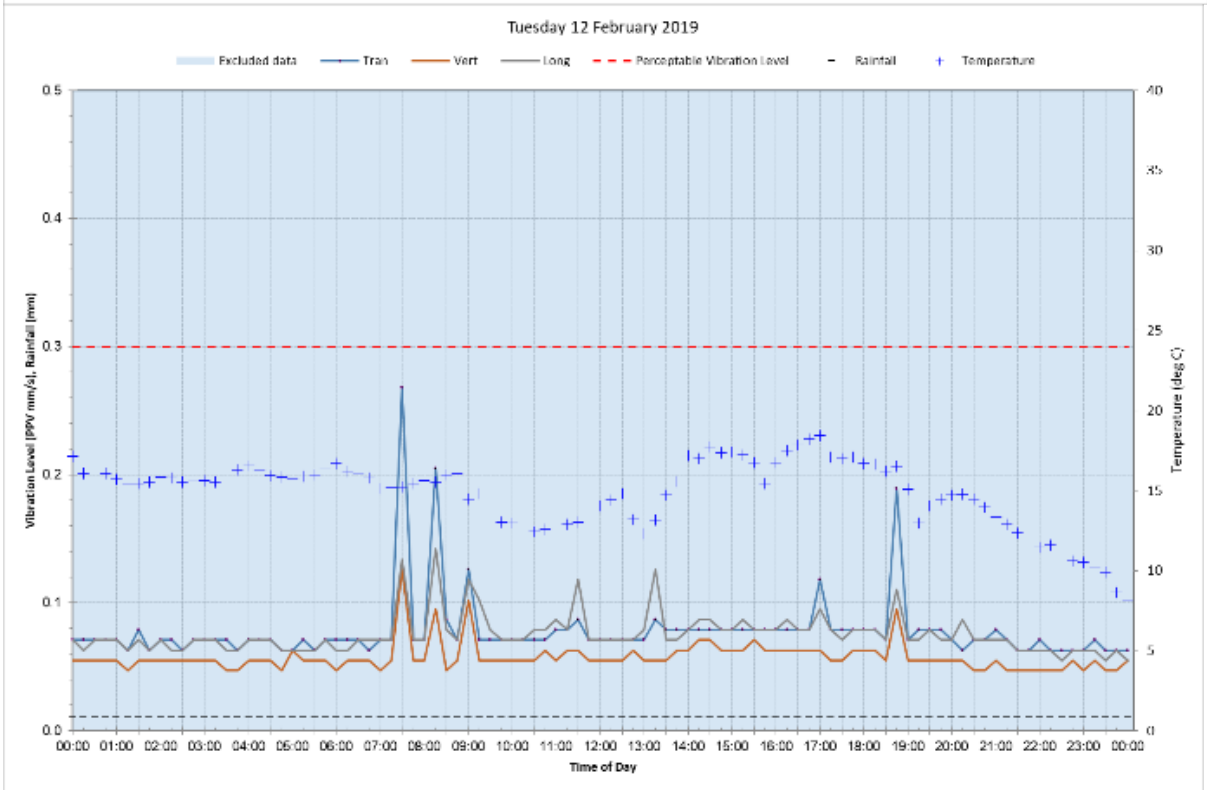
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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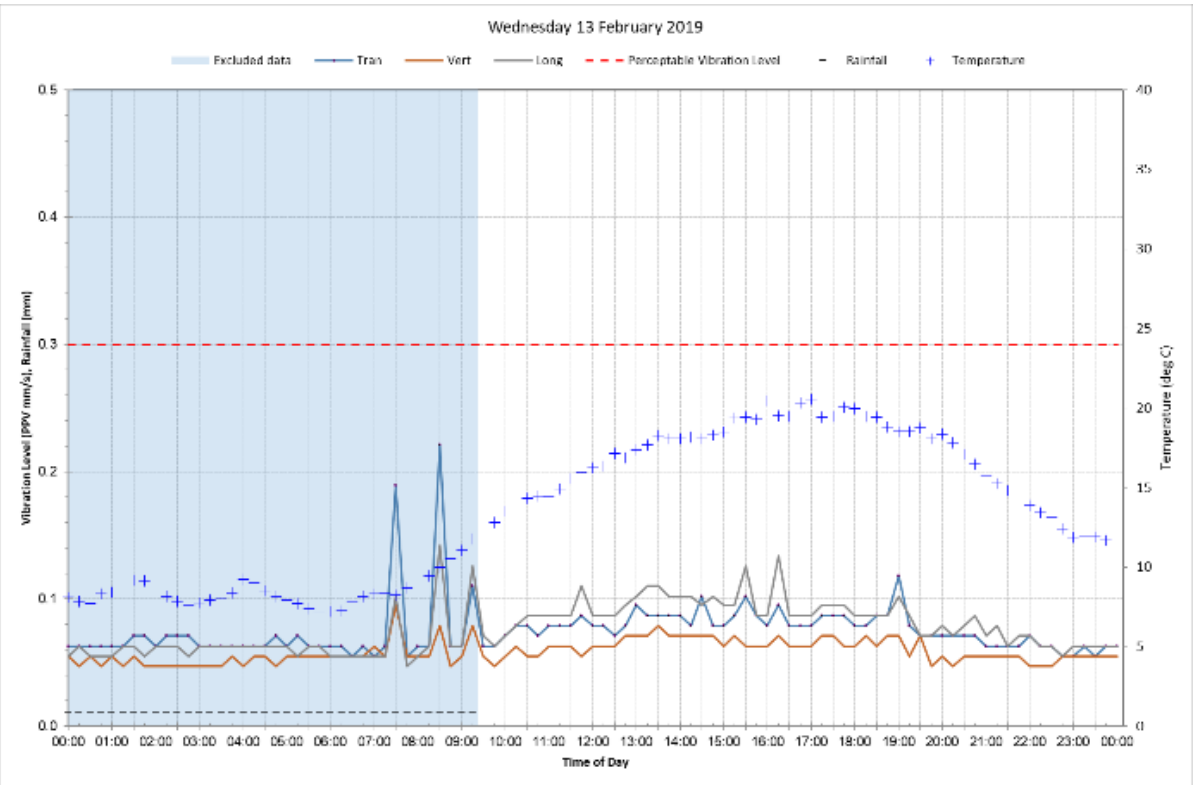
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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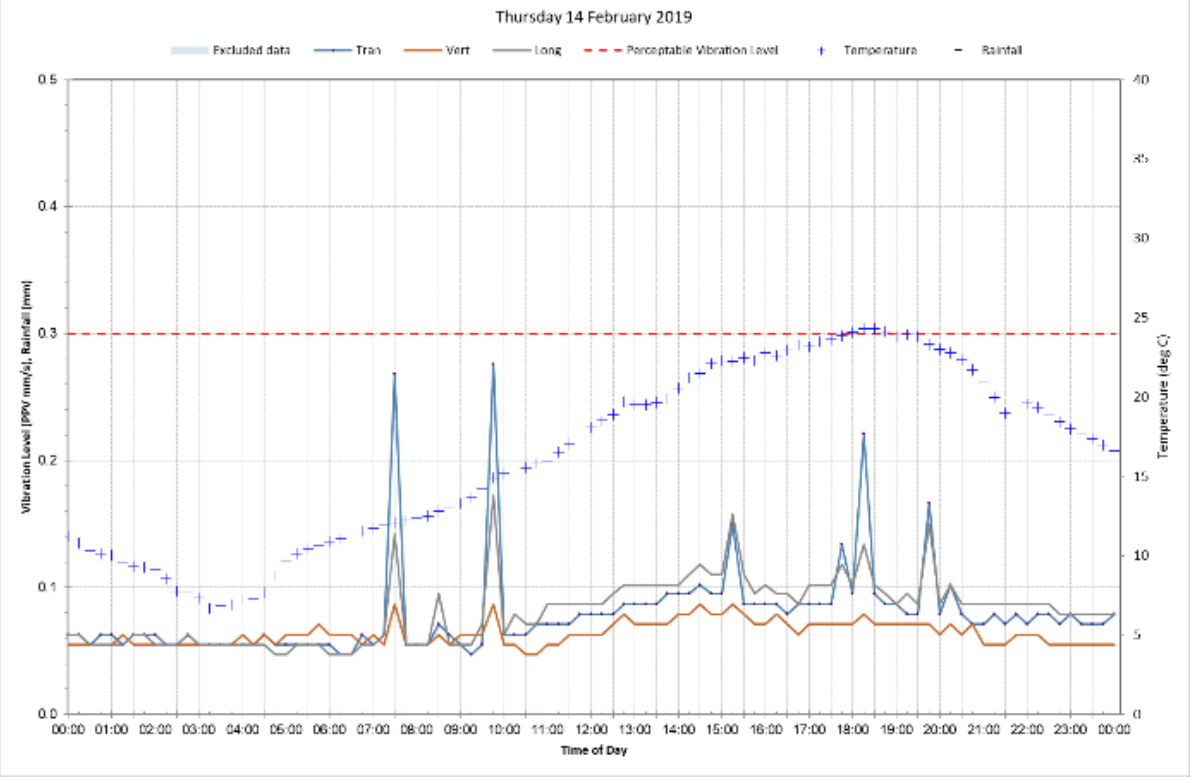
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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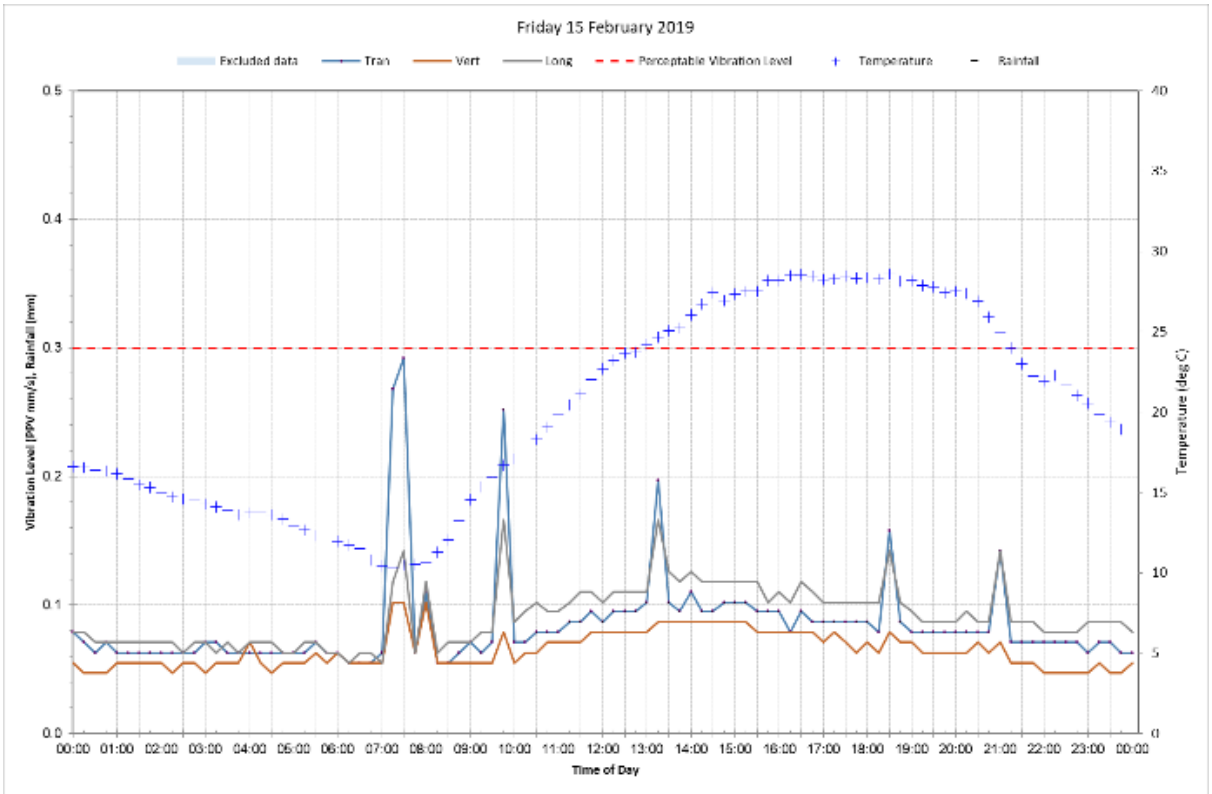
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day


Friday 15 February 2019
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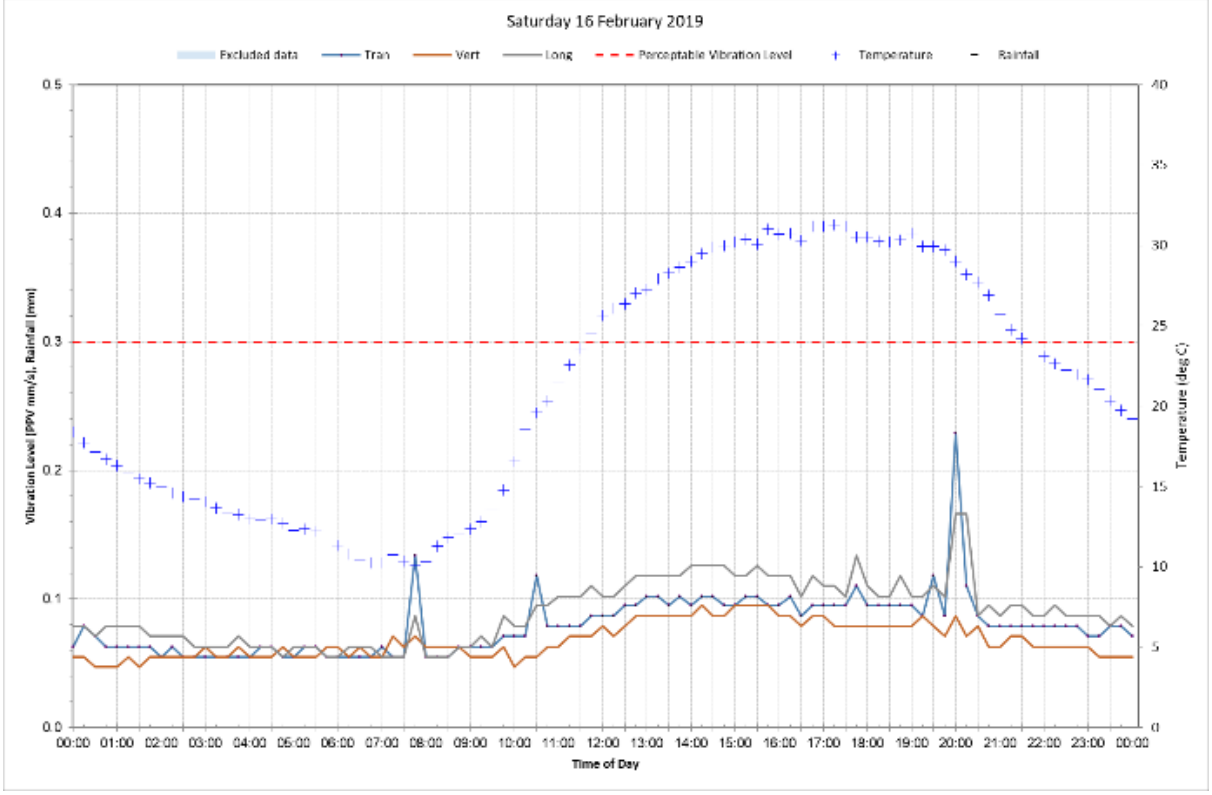
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day


Saturday 16 February 2019
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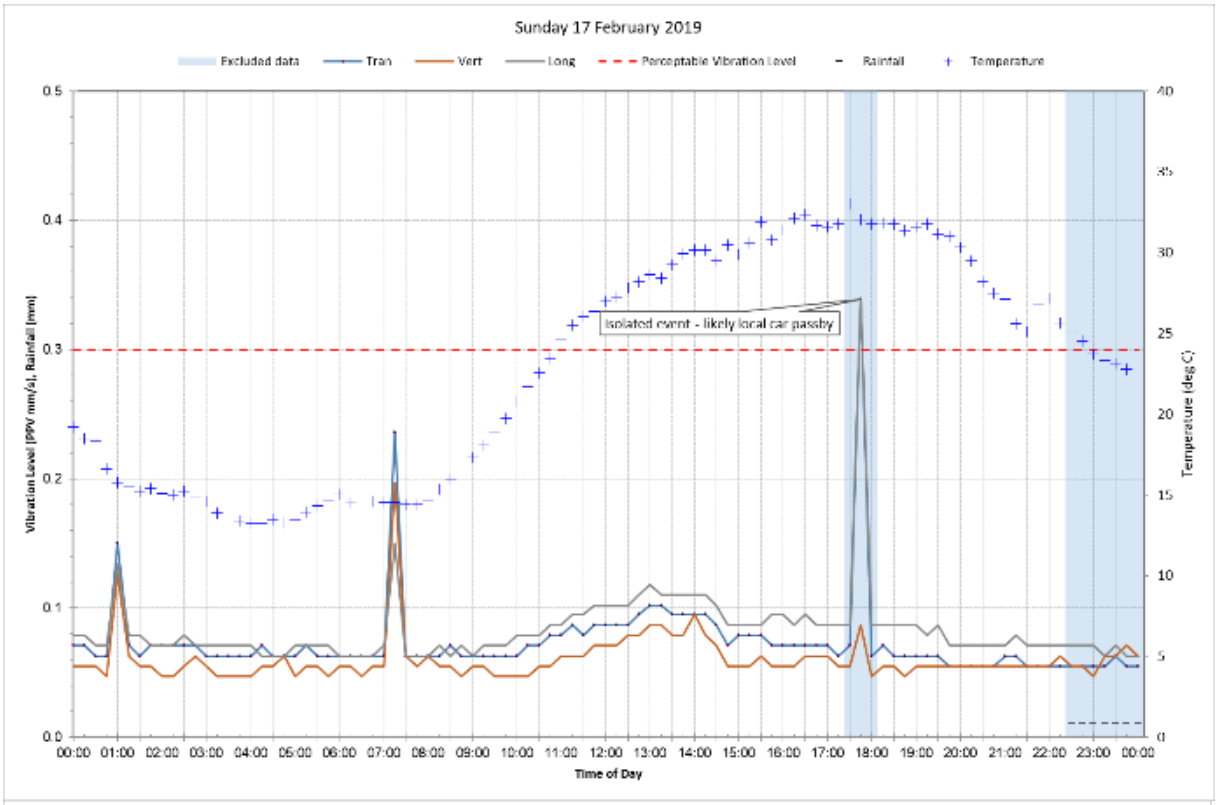
Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day


Sunday 17 February 2019
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Vert
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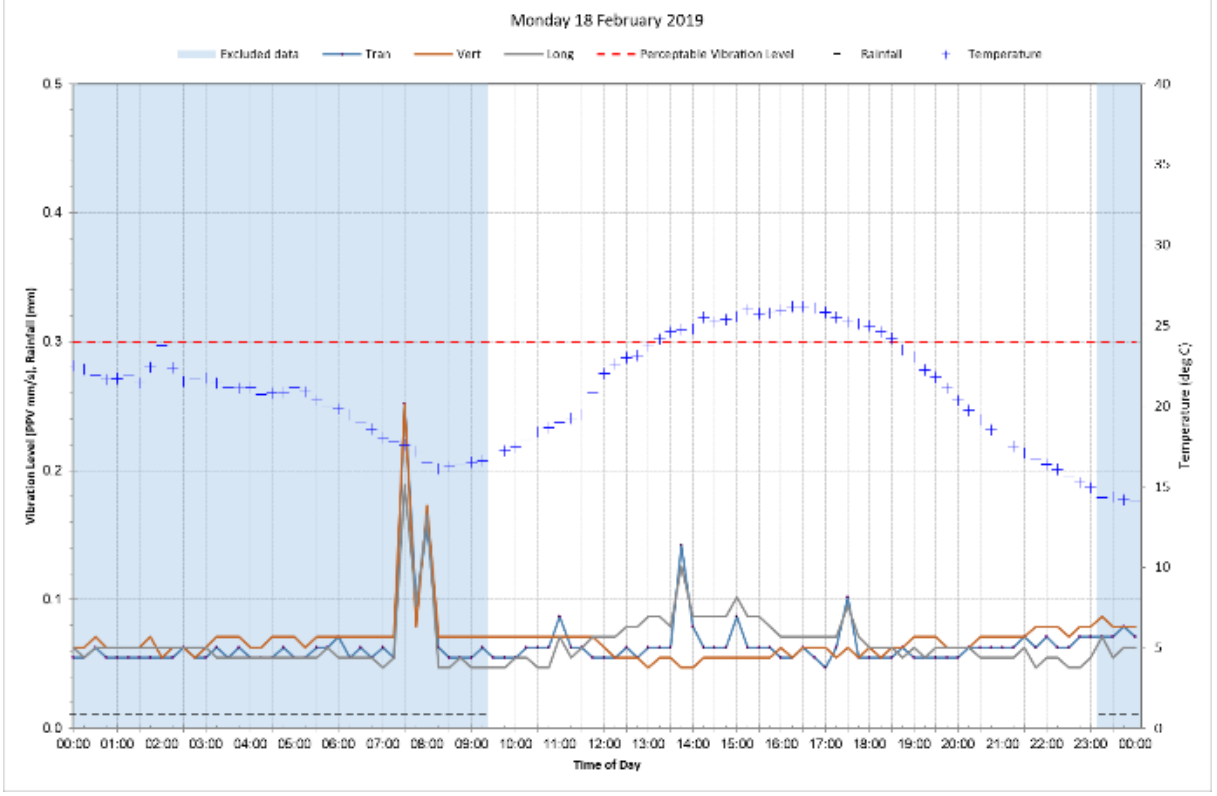
Perceptable Vibration Level
Rainfall
Temperature
Isolated event - likely local car passby
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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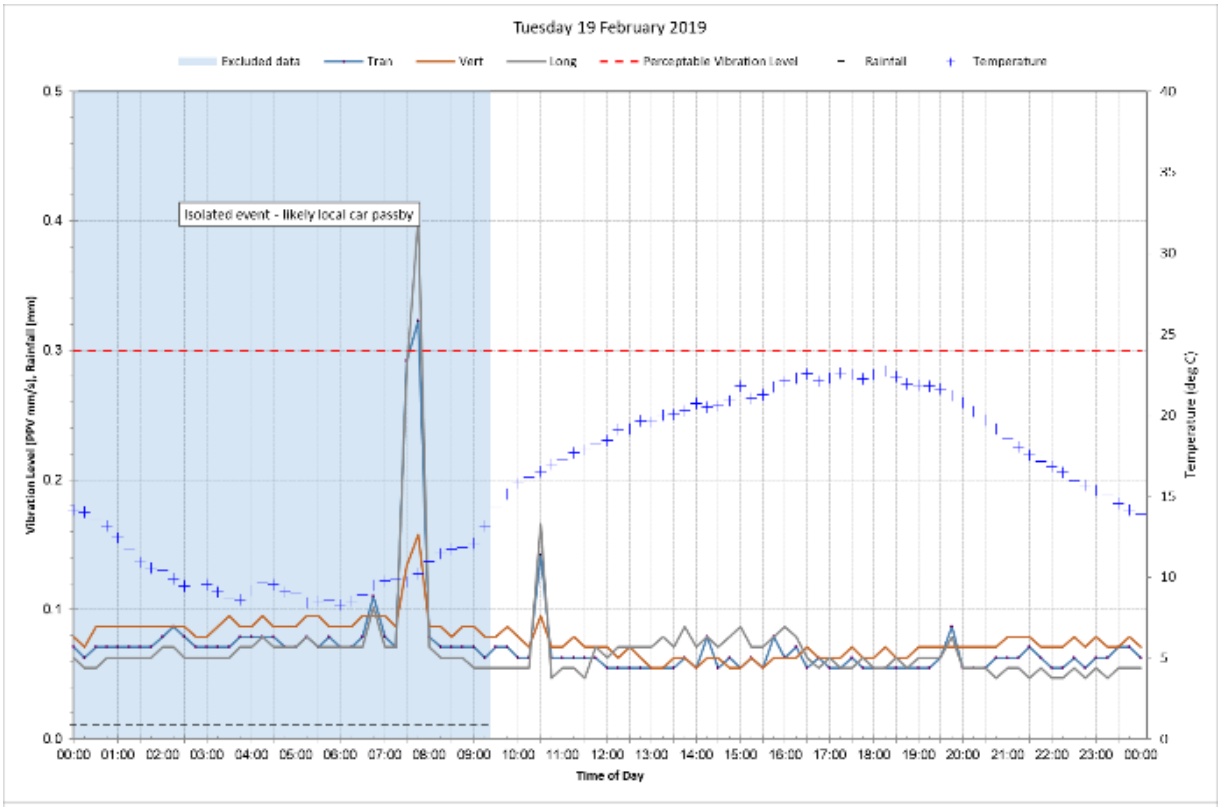
Vert
Long
Perceptable Vibration Level
Rainfall
Temperature
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature (deg C)
Time of Day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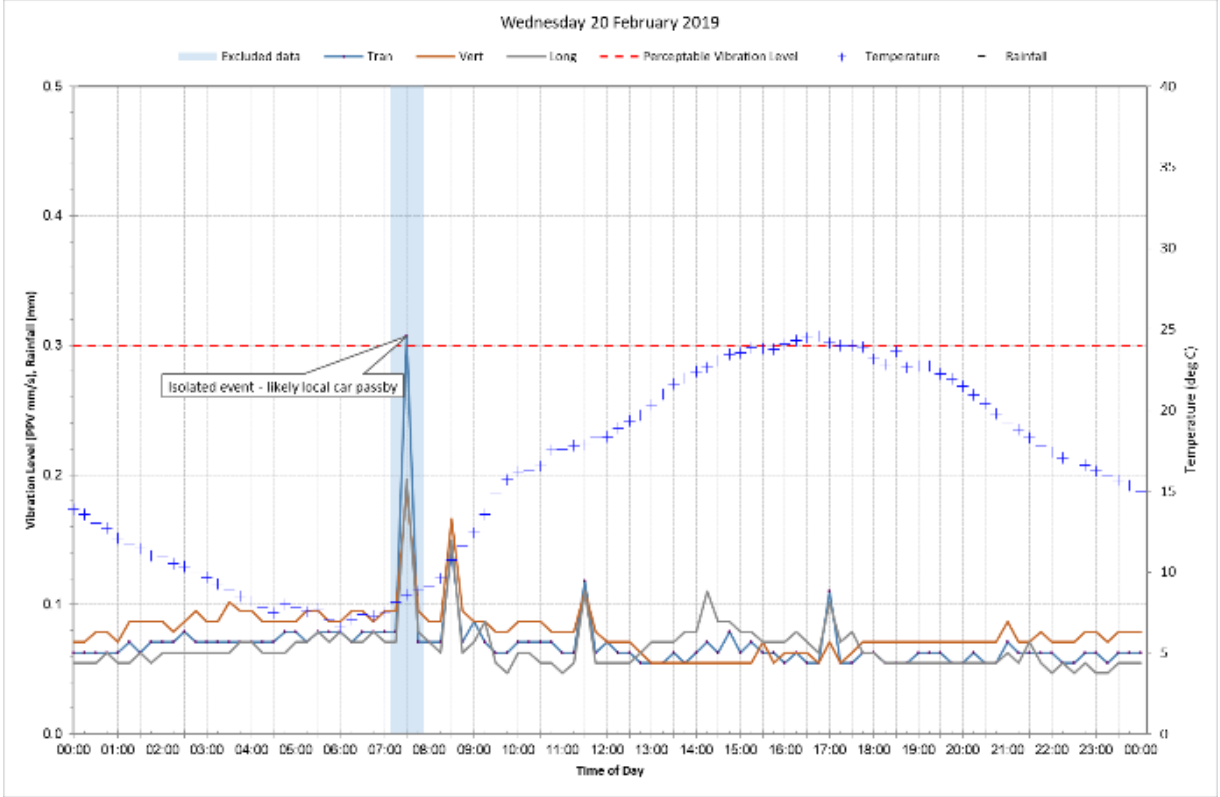
Perceptable Vibration Level
Rainfall
Temperature
Isolated event - likely local car passby
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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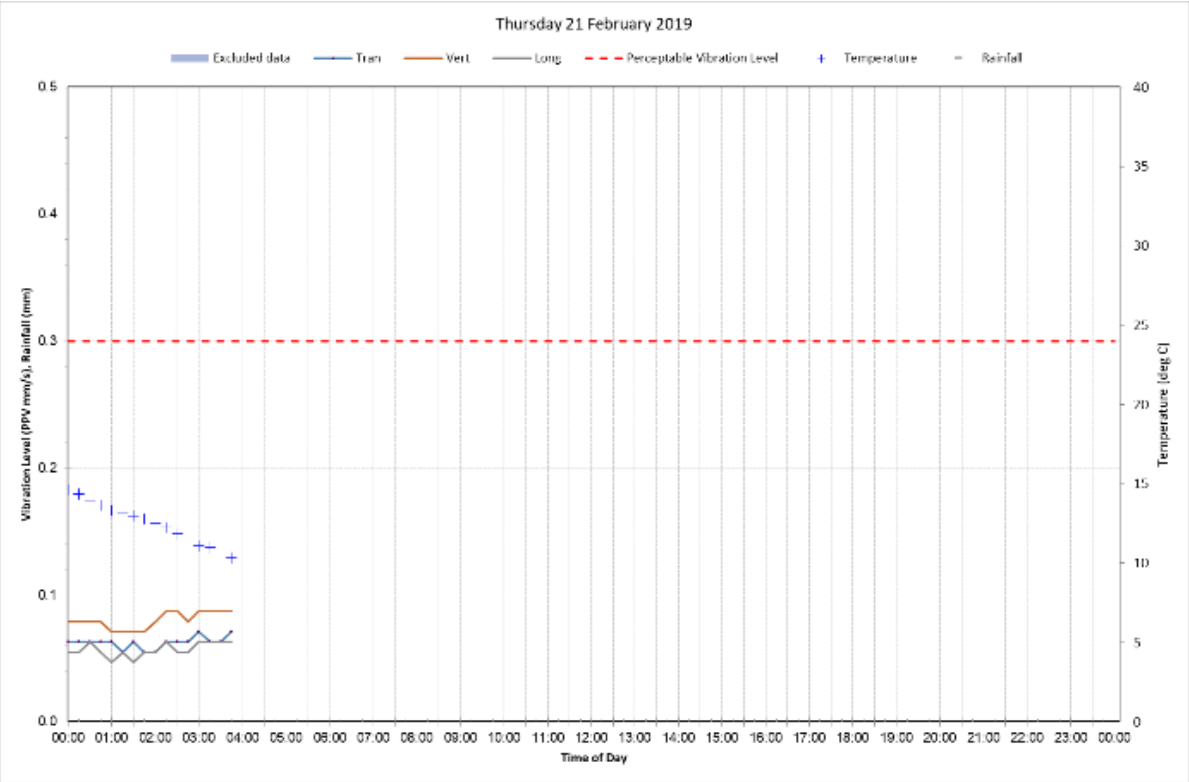
Temperature
Rainfall
Isolated event - likely local car passby
Vibration Level [PPV mm/s], Rainfall [mm]
Temperature [deg C]
Time of Day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Vert
Long
Perceptable Vibration Level
Temperature
Rainfall
Vibration Level (PPV mm/s), Rainfall (mm)
Temperature (deg C)
Time of Day
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3136874-81380/https://projects.ghd.com/oc/Victoria3/wim100baselinenoisea/Delivery/Documents/3136874-REP-Baseline Vibration Assessment.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A						29/03/2019
0	V.Alamshah	V.Lenchine		C.McVie		17/04/2019

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