



Tweed Valley Hospital Carpark

Existing Conditions Report (25.01.2022 - 01.02.2022)

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Document Title	Existing Conditions Report (25.01.2022 -
Attention To	ADCO Constructions Pty Ltd

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3	14/07/2022	20211491.6/1407A/R3/JJMZZ	MD		TJA

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1 INTRODUCTION

Acoustic Logic has been engaged to carry out noise, dust and vibration monitoring for the impacts associated with the earthworks, excavation and construction components of the Tweed Valley Hospital Carpark.

This monitoring report presents the noise, dust and vibration monitoring for the existing conditions before the commencement of works:

- Vibration Monitoring: 25th of January to 1st of February 2022;
- Noise Monitoring: 25th of January to 1st of February 2022; and
- Dust Monitoring: 25th of January to 1st of February 2022.

No construction work within the project site and the major noise /vibration source are construction activities from main work of the Hospital.

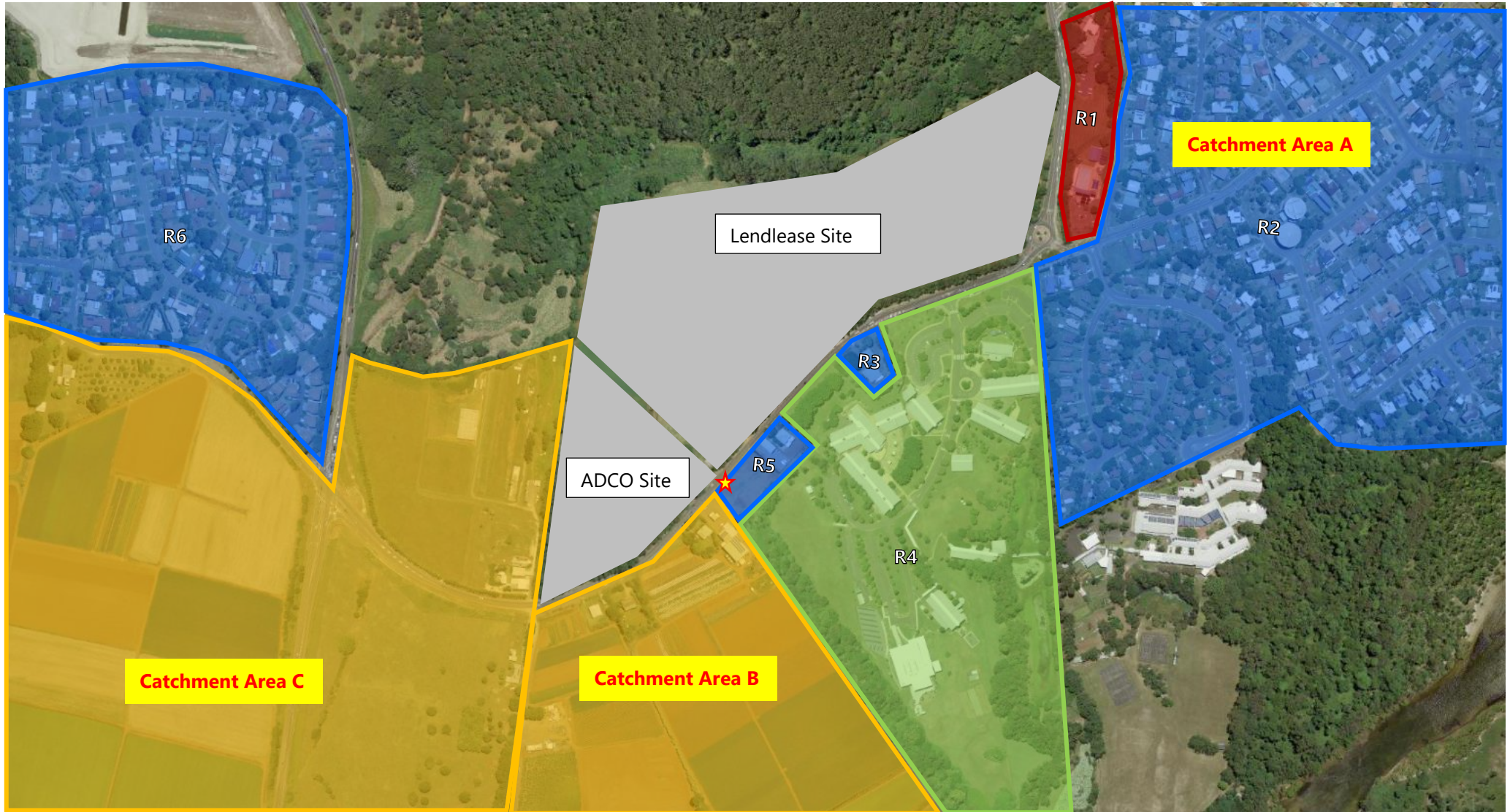
The location of the site is shown in [Figure 2-1](#) below. The location of the on-site monitors relative to the site has also been shown in [Figure 2-1](#).

The following Noise, Dust and Vibration Management levels have been derived from the Construction Noise, Dust and Vibration Management Plan, document reference 20211491.1/2911A/R2/OB.

2 SITE DESCRIPTION AND SENSITIVE RECEIVERS

The subject site is located on Cudgen Rd, Kingscliff as indicated in [Figure 2-1](#). The land uses surrounding the proposed multi-storey carpark site are existing commercial, residential and educational receivers. The nearest potentially most affected receivers are:

- **Receiver 1:** Tweed Regional Aquatic Centre – Kingscliff (east)
- **Receiver 2:** Residential dwellings located on 32-58 Cudgen Road (east)
- **Receiver 3:** Residential dwelling located at 792 Cudgen Road (south)
- **Receiver 4:** TAFE NSW – Kingscliff (south)
- **Receiver 5:** Residential dwelling located at 764 Cudgen Road (south)
- **Receiver 6:** Residential receivers at 6-30 John Robb Way (west)



- Industrial/Agricultural
- Commercial Receiver

Figure 2-1 –Site and Sensitive Receiver Locations

- Site
- Residential Receiver
- Educational/Tafe

3 VIBRATION CRITERIA

The following vibration monitoring criteria has been derived from the Construction Noise, Dust and Vibration Management Plan, document reference: 20211491.1/2911A/R2/OB.

CONSTRUCTION VIBRATION CRITERIA

Vibration criteria for the nearest receivers will be based on the following documents:

- DIN 4150, *Vibration in Buildings (2016-12)*;
- EPA *“Assessing Vibration: A technical guideline”*; and
- ASHRAE Handbook 2007.

Summarised Recommended Vibration Limits

The summarised vibration criteria are presented in the table below.

Table 9 – Recommended Vibration Limit

Vibration Receiver	Recommended Vibration Limits PPV (mm/s)
Residential Buildings	5
Commercial/Other Buildings	20

4 VIBRATION MONITORING

4.1 MEASUREMENT EQUIPMENT

Vibration monitoring was conducted using one Texcel ETM vibration monitors with an external tri-axial Geophone. The monitor is programmed to store statistical vibration data over every 5-minute period, along with any 'triggered' events that occur throughout the monitoring period. The following Section presents the results of vibration monitoring for the period between the 25th of January to the 1st of February 2022. No construction works on site as per 7 days existing conditions monitoring period conditions.

4.2 MEASUREMENT RESULTS

Table 1 – Vibration Monitoring Results

Vibration Geophone Location	Date	Maximum Measured Vibration Level mm/s	Criteria Vibration Level	Complies
Monitoring Location	25/01/2022	1.15	5mm/s PPV	Yes
	26/01/2022	0.85		Yes
	27/01/2022	1.04		Yes
	28/01/2022	0.83		Yes
	29/01/2022	1.02		Yes
	30/01/2022	2.43		Yes
	31/01/2022	0.84		Yes

5 NOISE MONITORING

5.1 DEFINITION OF TERMS

Environmental noise is complex in nature. The noise level fluctuates from moment to moment and the noise characteristic can vary depending on the particular noise source in the vicinity (for example road, railway, and factory).

For this reason, various terms and descriptors have been developed to quantify the noise environment in a way that reflects human perception. The terms used in this noise assessment are described below:

dB(A)

Unit of loudness. The higher the number, the louder the noise. A change in noise level of up to 3 dB(A) is barely perceptible. A 5 dB(A) change is noticeable. A 10 dB(A) change is subjectively a doubling of noise.

Noise Descriptors

For time varying noise sources (such as traffic noise and general environmental noise) it is not possible to assess noise impacts based on a single instantaneous measurement. It is necessary to measure noise over a discrete period until a representative sample of noise has been obtained.

The descriptors used in this assessment are defined below.

L₁

The sound pressure level that is exceeded for 1 percent of the time for which the given sound is measured.

L₁₀

The sound pressure level that is exceeded for 10 percent of the time for which the given sound is measured.

L₉₀

The sound pressure level that is exceeded for 90 percent of the time for which the given sound is measured.

L_{Aeq}

Equivalent sound pressure level – steady sound level that, over a specified period, would produce the same energy equivalence as the fluctuating sound level actually occurring.

5.2 NOISE MANAGEMENT CRITERIA

NOISE MANAGEMENT LEVEL

Establishment of criteria for construction noise requirements will be in accordance with the following documents.

- NSW Environmental Protection Authority, 'Interim Construction Noise Guideline';
- Australian Standard AS2107:2016; and
- Australian Standards AS2436:2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites.

Location	Management level, dB(A) L_{eq} (15 min)
Residential Receivers	Recommended Standard Hours "Noise Affected" Level – 55 "Highly Noise Affected" Level - 75
Commercial Receivers	70
Educational Receivers	45 (Internal)
Office Areas	
X-Ray Areas	50(Internal)

5.3 EQUIPMENT USED

Unattended noise monitoring was conducted using a *SiteHive Hexanode 134* noise and dust monitor. The monitor was programmed to store 15-minute statistical noise levels throughout the monitoring period. Measurements were taken on A-frequency weighting and fast time weighting.

5.4 MEASURED NOISE LEVELS

The available measured noise levels have been analysed by this office and the graphed noise data presented in Appendix 1.

Please note that the presented data represents the available monitoring data for the period described in [Table 2](#). Summarised results are also in [Table 2](#) below.

Table 2 – Noise Monitoring Results

Date	Measured typical worst noise level dB(A) L_{eq} 15min	Noise Management Level dB(A) L_{eq} 15min "Highly Affected Noise"	Exceedance
25/01/2022	69	75	Note 1
26/01/2022	69		
27/01/2022	69		
28/01/2022	68		
29/01/2022	68		
30/01/2022	71		
31/01/2022	70		

Note 1: No construction works from ADCO site during monitoring phase to establish "Existing Conditions".

6 DUST

6.1 ASSESSMENT CRITERIA

Dust monitoring has been conducted to measure mechanically generated respirable PM_{2.5} dust particles (< 2.5µm) and PM₁₀ dust particles (< 10µm), which are generally understood to be the main health concern in airborne dust. The air quality limits are based on the standards outlined in Department of the Environment's *National Environment Protection (Ambient Air Quality) Measure* and NSW EPA's air quality categories.

It should be noted that the dust monitoring results can be influenced by events such as fires and dust storms, thus the PM₁₀ limit has an allowance of 5 days per year to account for the effects of such events.

The PM_{2.5} and PM₁₀ goals are summarised below.

Table 3 – PM_{2.5} and PM₁₀ Goals (24-Hour Average)

Pollutant	Averaging Time	Maximum Concentration
PM _{2.5}	24 hours	25 µg/m ³
PM ₁₀	24 hours	50 µg/m ³

The EPA has air quality categories based on particle concentration over a one hour average. As per the Construction Noise, Dust and Vibration management Plan, this project has targeted the 'Poor' category as a reference, **however, the assessment level is the 24-hour average.**

Table 4 – PM_{2.5} and PM₁₀ Goals (1-Hour Average)

Pollutant	Air Quality Category	Maximum Concentration
PM _{2.5}	Poor	62-97 µg/m ³
PM ₁₀		80-120 µg/m ³

6.2 MEASUREMENT DETAILS

6.2.1 Equipment

The dust monitoring was conducted using a *SiteHive Hexanode 134* noise and dust monitor.

6.2.2 Period

Dust monitoring was conducted from 25/01/2022 to 01/02/2022.

6.3 MEASUREMENT RESULTS

The **daily average** PM_{2.5} and PM₁₀ concentration levels are presented below.

Table 5 – 24hr Average PM_{2.5} and PM₁₀ Concentration

Date	24hr Average PM _{2.5} and PM ₁₀ Concentration					
	PM _{2.5} Level (µg/m ³)	PM _{2.5} Limit (µg/m ³)	Complies	PM ₁₀ Level (µg/m ³)	PM ₁₀ Limit (µg/m ³)	Complies
25/01/2022	5	25	Yes	22	50	Yes
26/01/2022	6		Yes	24		Yes
27/01/2022	5		Yes	18		Yes
28/01/2022	6		Yes	19		Yes
29/01/2022	7		Yes	23		Yes
30/01/2022	7		Yes	22		Yes
31/01/2022	5		Yes	21		Yes

The **daily maximum 1hour** PM_{2.5} and PM₁₀ concentration levels are presented below.

Table 6 – 1Hr Maximum PM_{2.5} and PM₁₀ Concentration

Date	Maximum 1hr Average PM _{2.5} and PM ₁₀ Concentration					
	PM _{2.5} Level (µg/m ³)	PM _{2.5} Limit (µg/m ³)	Complies	PM ₁₀ Level (µg/m ³)	PM ₁₀ Limit (µg/m ³)	Complies
25/01/2022	9	62-97	Yes	44	80-120	Yes
26/01/2022	13		Yes	55		Yes
27/01/2022	9		Yes	29		Yes
28/01/2022	9		Yes	27		Yes
29/01/2022	12		Yes	39		Yes
30/01/2022	11		Yes	35		Yes
31/01/2022	10		Yes	54		Yes

7 CONCLUSION.

Acoustic Logic Consultancy has carried out noise, dust and vibration monitoring for the **existing conditions phase** of the Tweed Valley Hospital Carpark. No construction work was carried out on the project site during this monitoring period.

This monitoring report presents the noise and vibration monitoring for the periods as follows:

- Vibration Monitoring: 25th of January to 1st of February 2022; and
- Noise Monitoring: 25th of January to 1st of February 2022; and
- Dust Monitoring: 25th of January to 1st of February 2022.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,



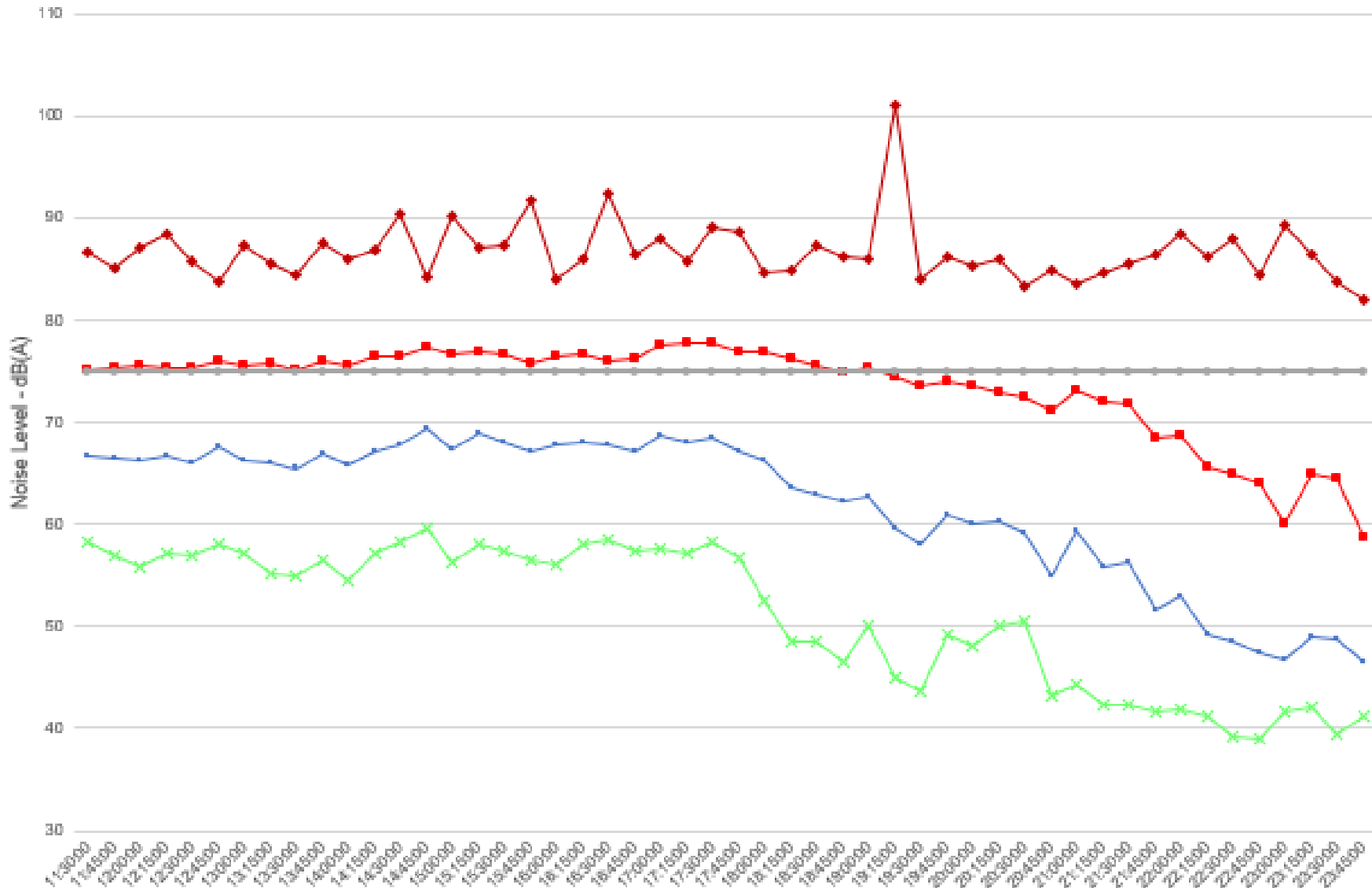
Acoustic Logic Pty Ltd



APPENDIX 1 – NOISE MONITORING RESULTS



— Leq — Lmax — L10 — L90 — Highly Noise Effected

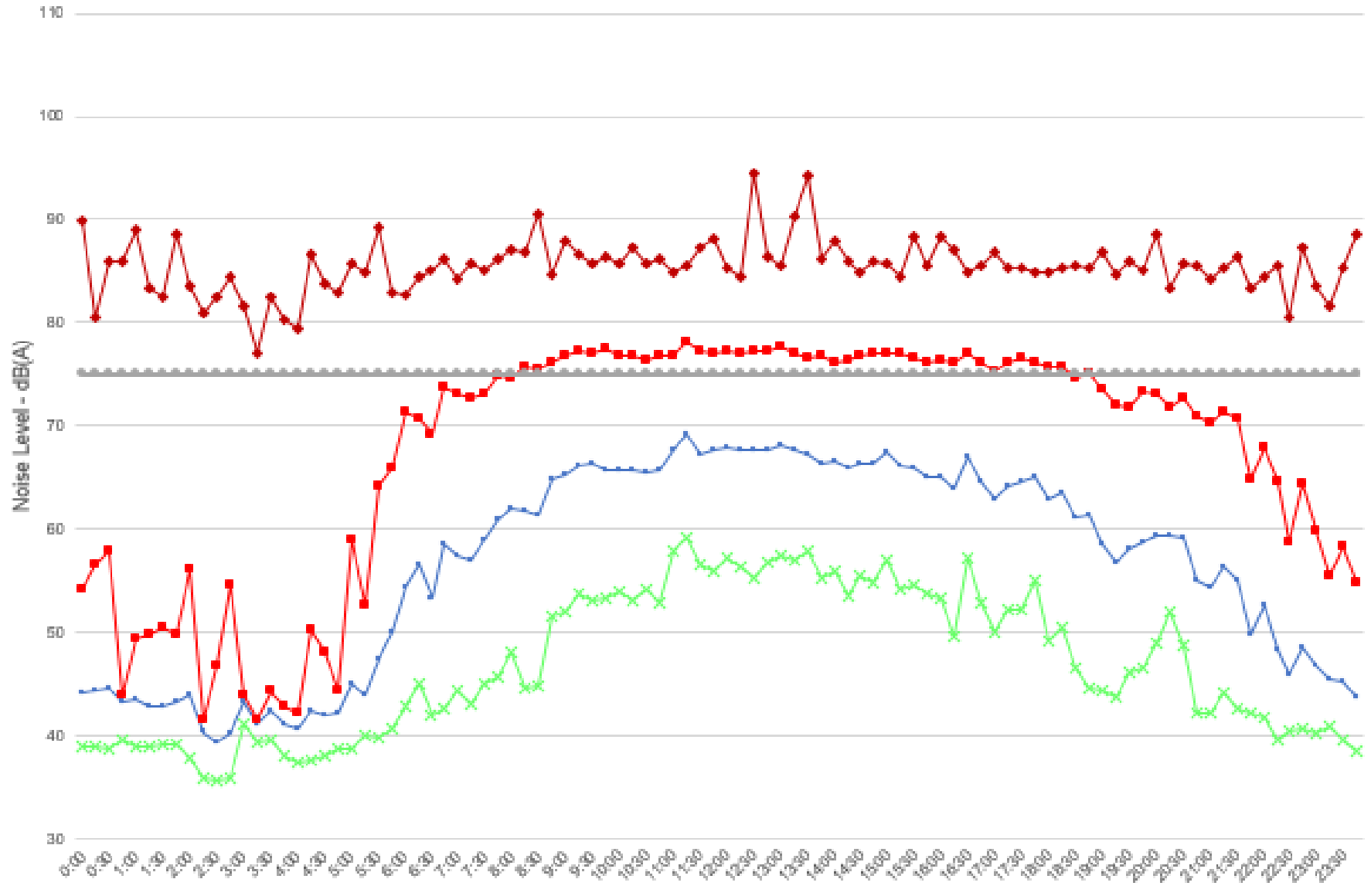


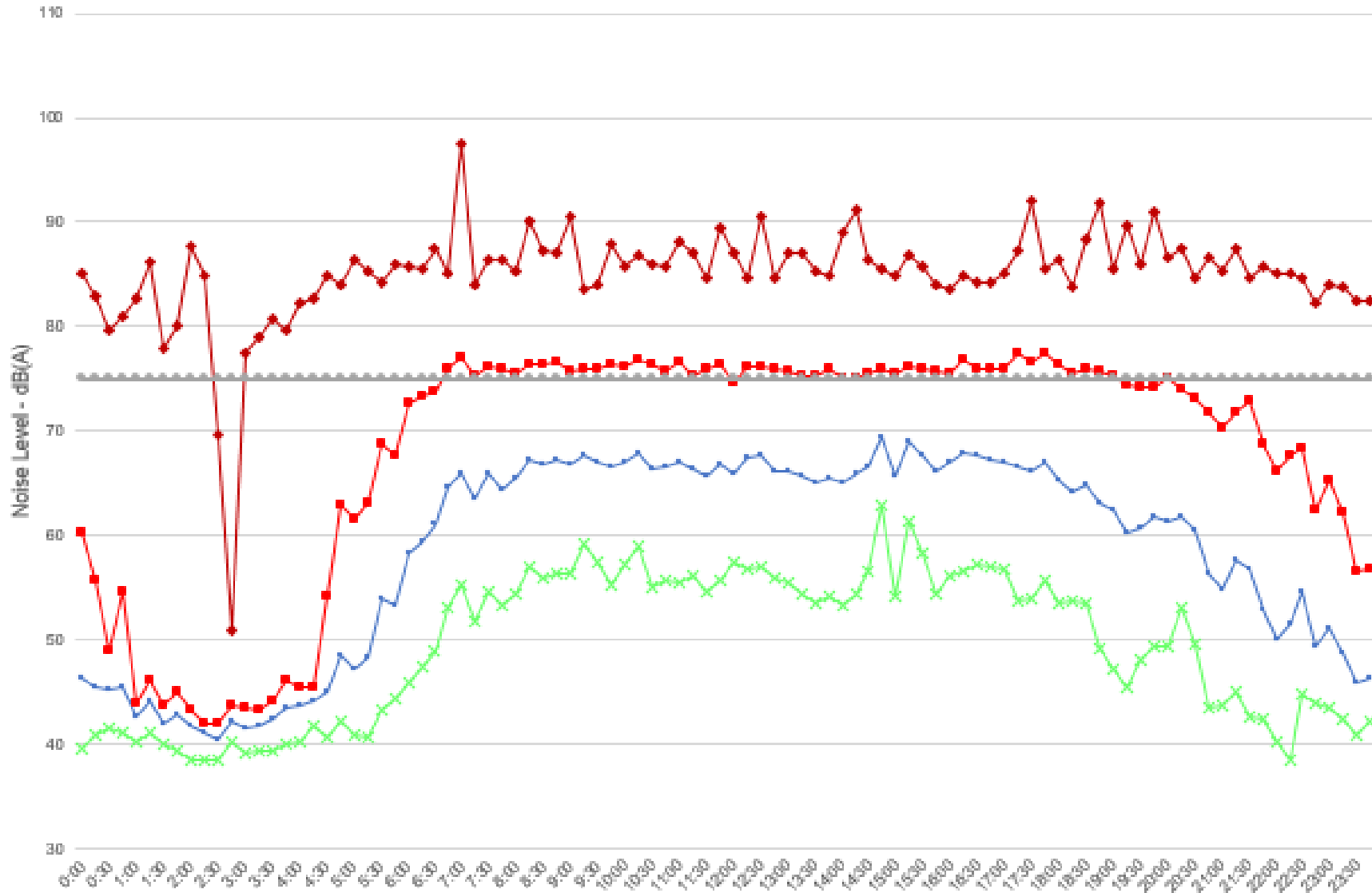


**ACOUSTIC
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Noise Monitoring: Wednesday 26/01/2022

— Leq — Lmax — L10 — L90 — Highly Noise Effected



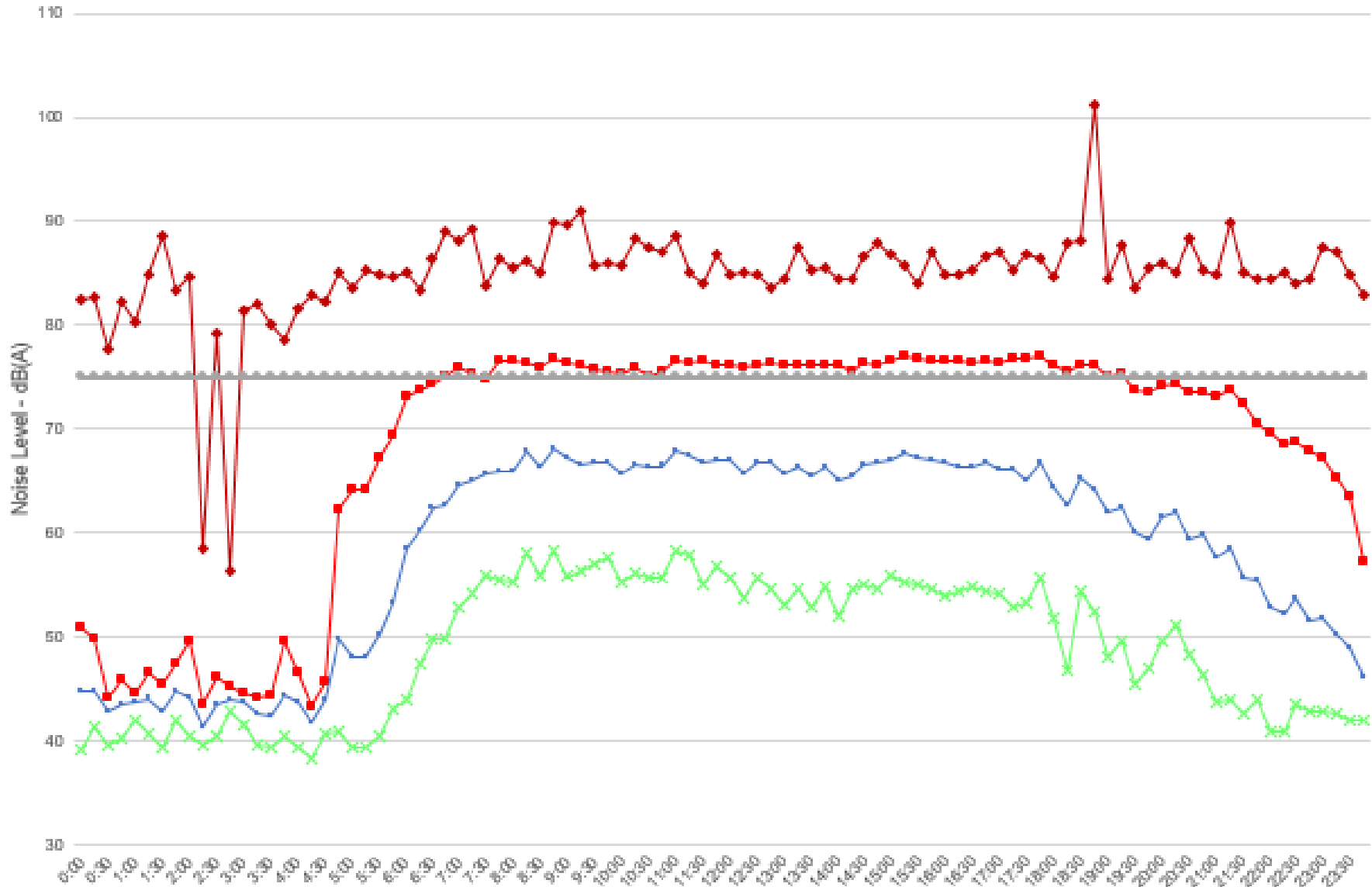




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Noise Monitoring: Friday 28/01/2022

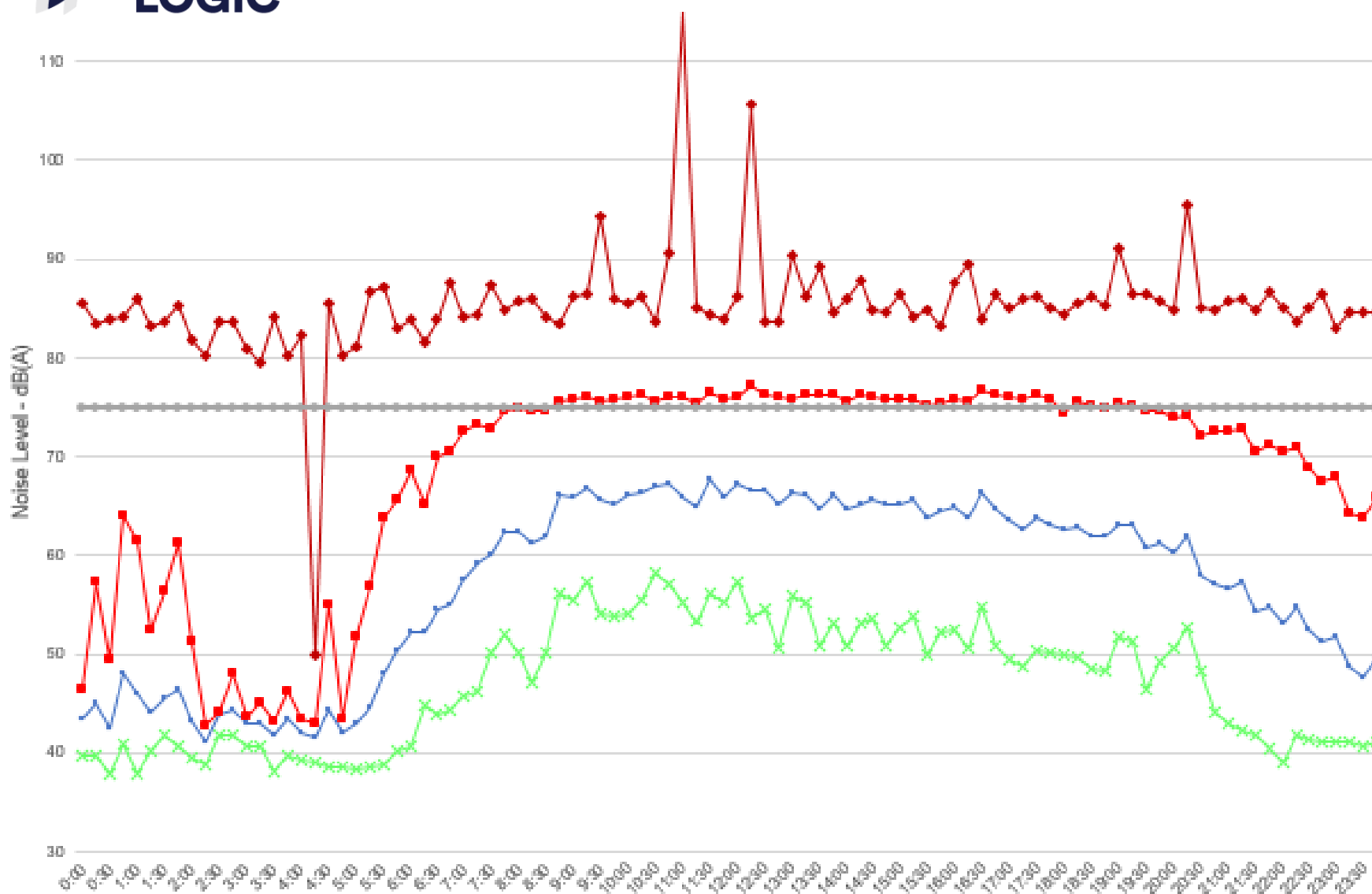
— Leq — Lmax — L10 — L90 — Highly Noise Effected





Noise Monitoring: Saturday 29/01/2022

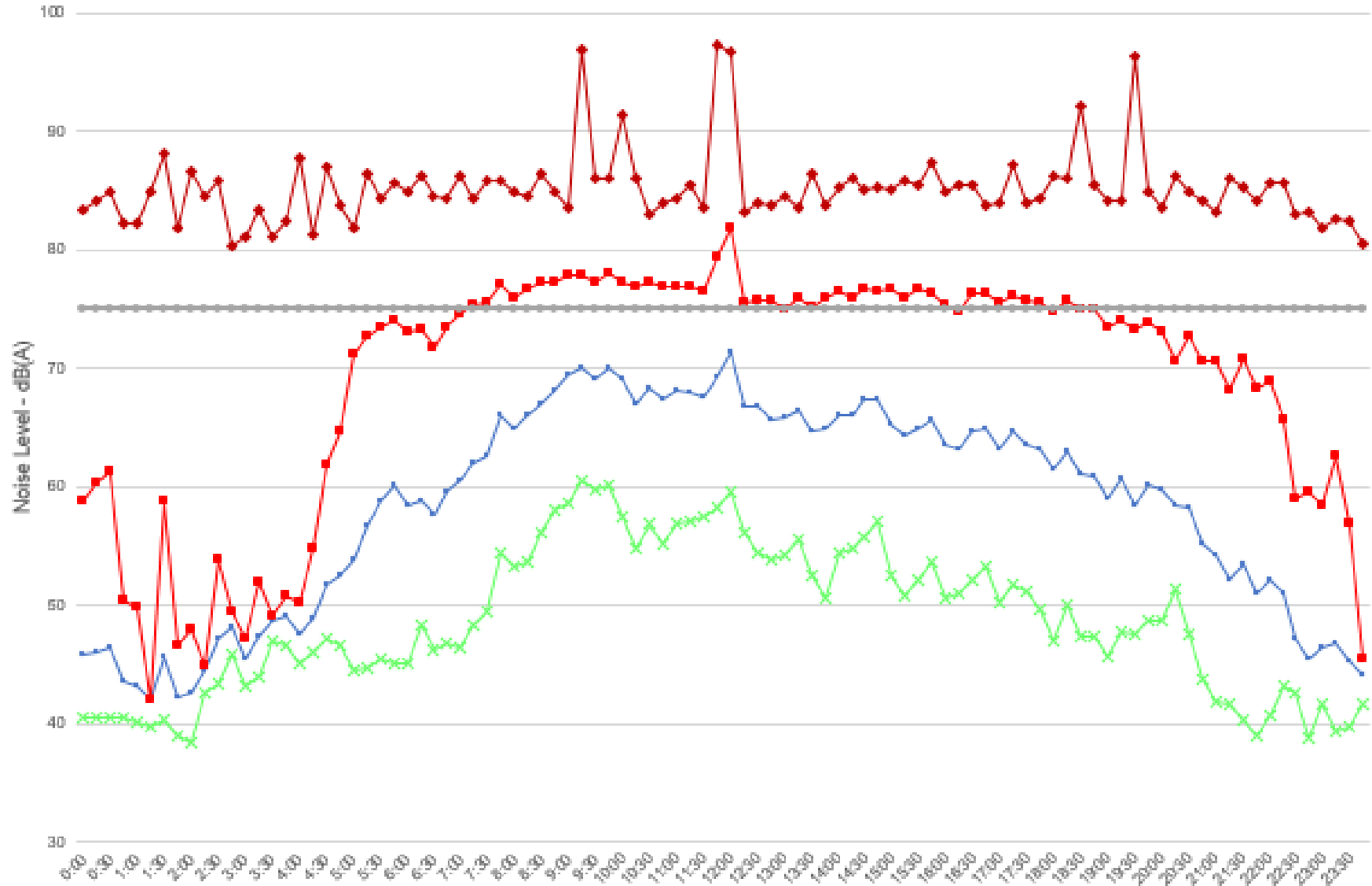
— Leq — Lmax — L10 — L90 — Highly Noise Effected





Noise Monitoring: Sunday 30/01/2022

— Leq — Lmax — L10 — L90 — Highly Noise Effected

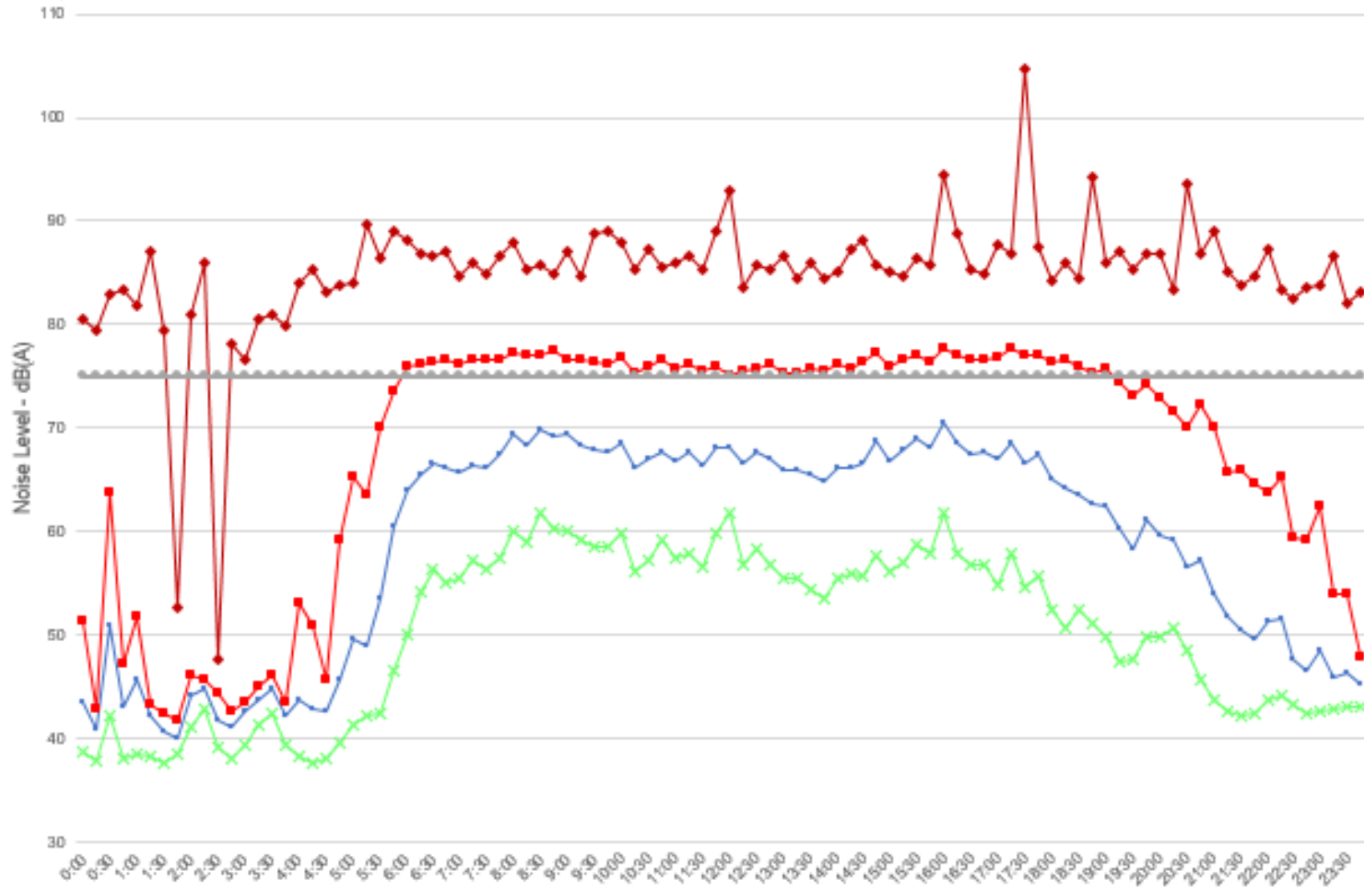




ACOUSTIC LOGIC

Noise Monitoring: Monday 31/01/2022

— Leq — Lmax — L10 — L90 — Highly Noise Effected



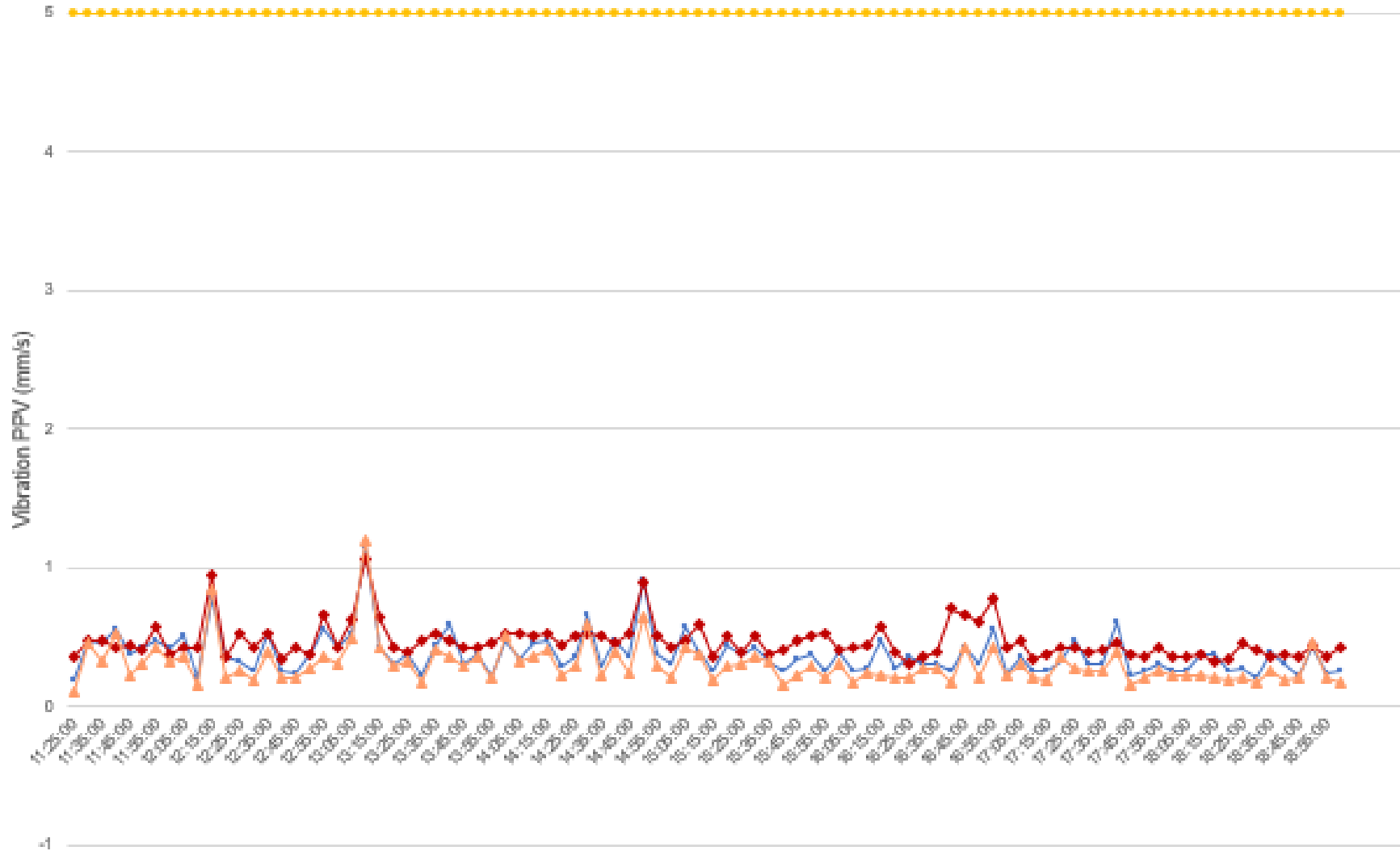
APPENDIX 2 – VIBRATION MONITORING RESULTS



ACOUSTIC LOGIC

Vibration Monitoring: Tuesday 25/01/2022

Radial (mm/s) Transverse (mm/s) Vertical (mm/s) Limit

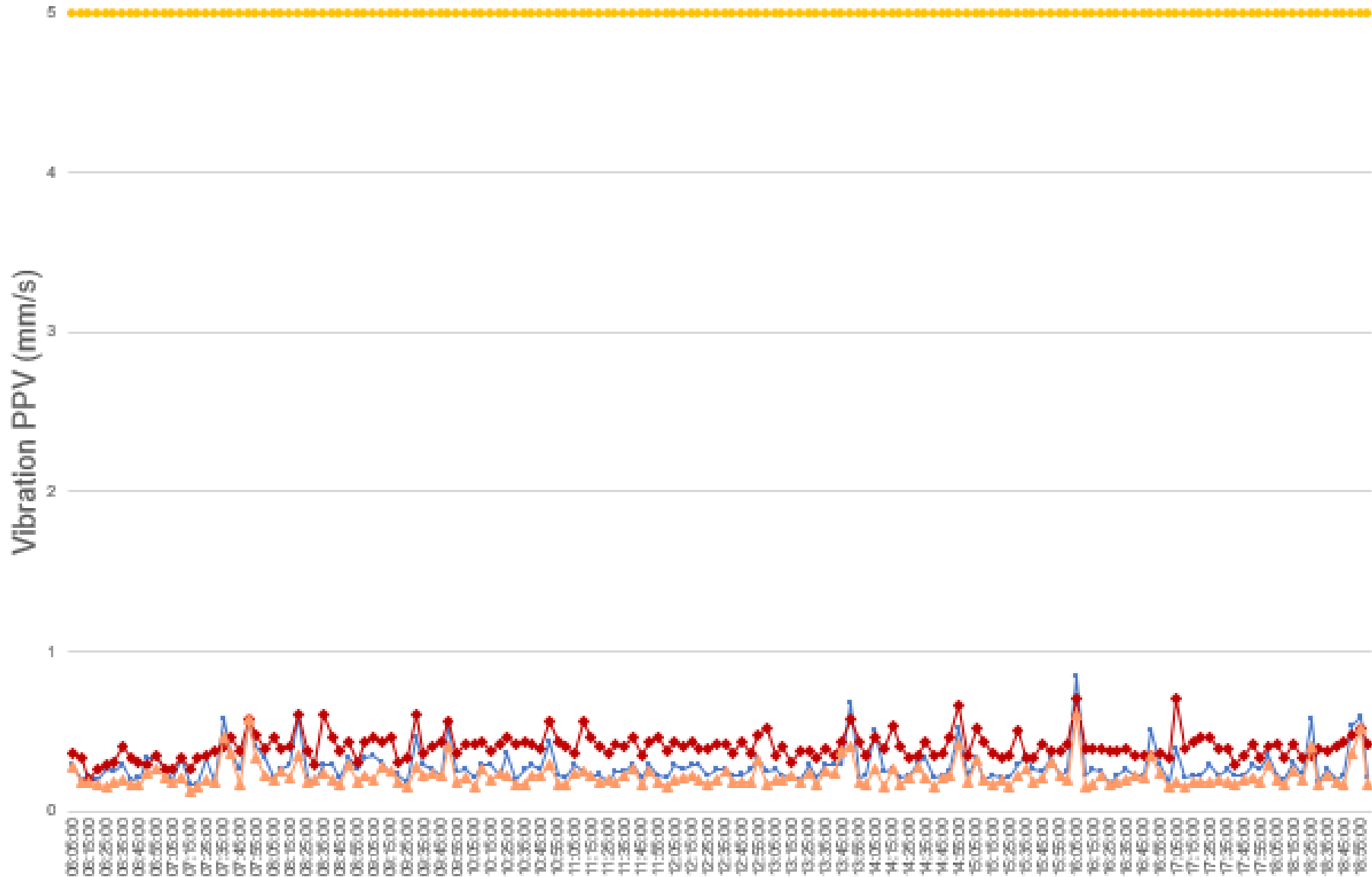




**ACOUSTIC
LOGIC**

Vibration Monitoring: Wednesday 26/01/2022

—•— Radial (mm/s) —•— Transverse (mm/s) —•— Vertical (mm/s) —•— Limit

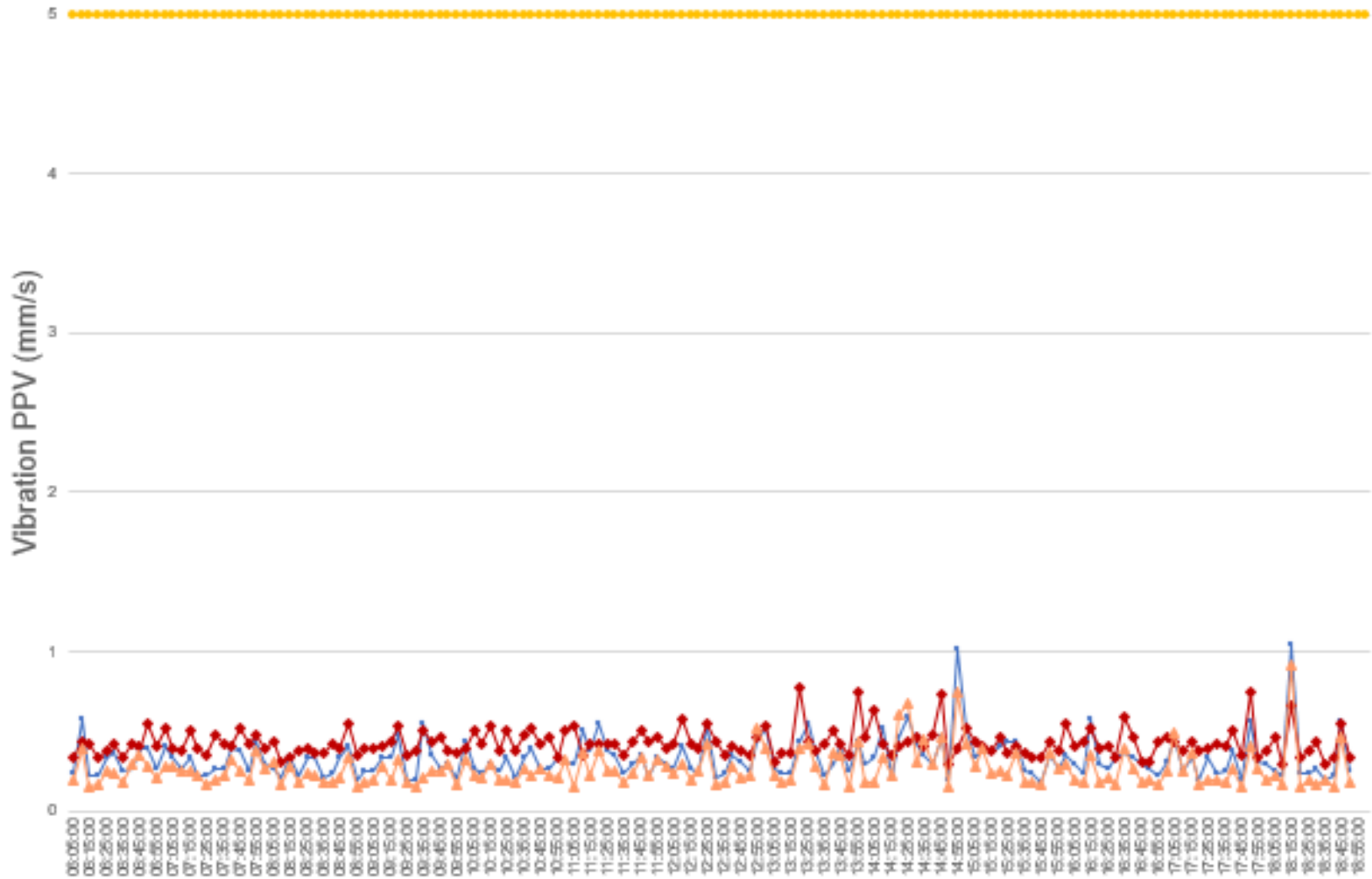




ACOUSTIC LOGIC

Vibration Monitoring: Thursday 27/01/2022

— Radial (mm/s) — Transverse (mm/s) — Vertical (mm/s) — Limit

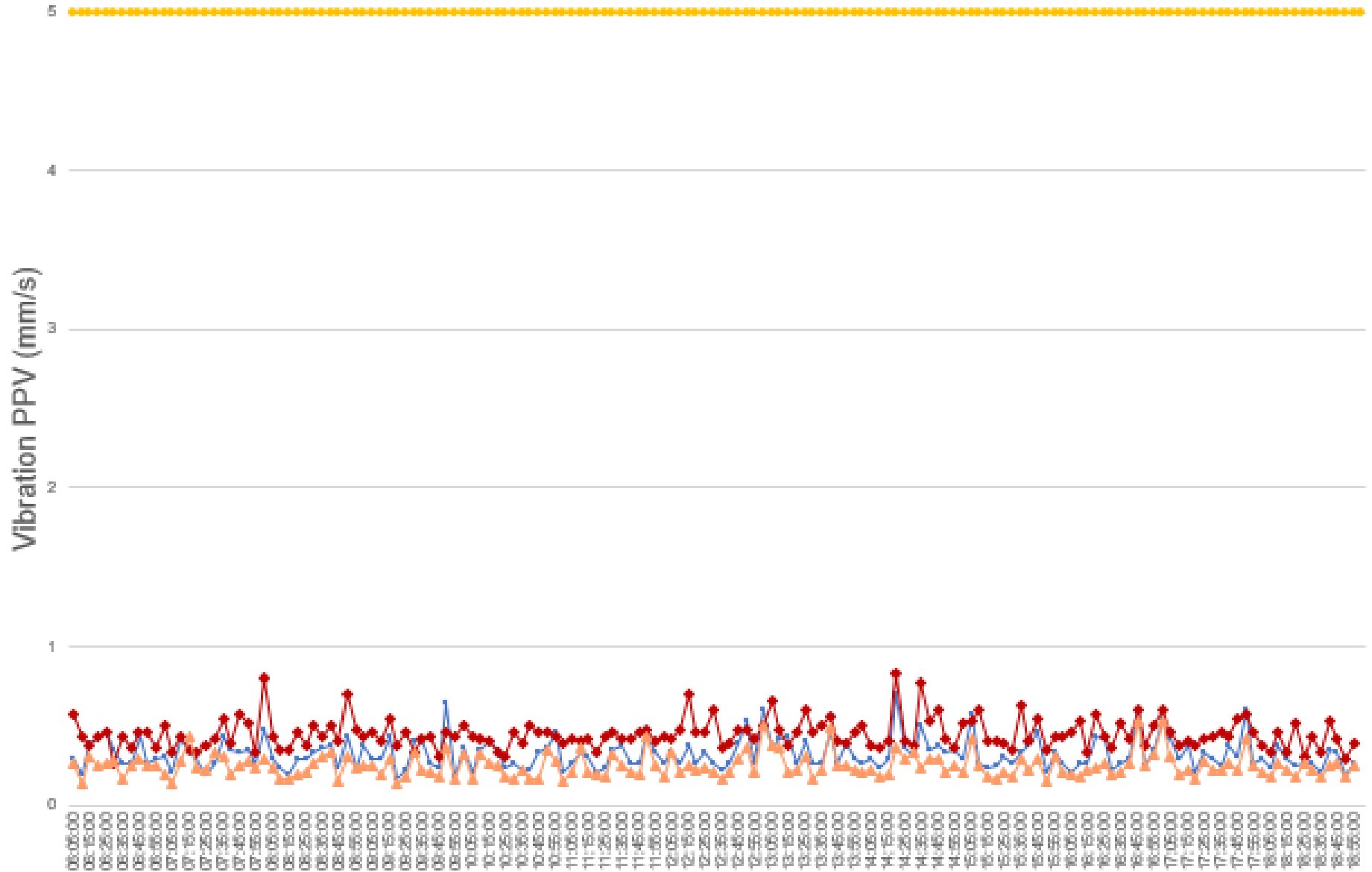




**ACOUSTIC
LOGIC**

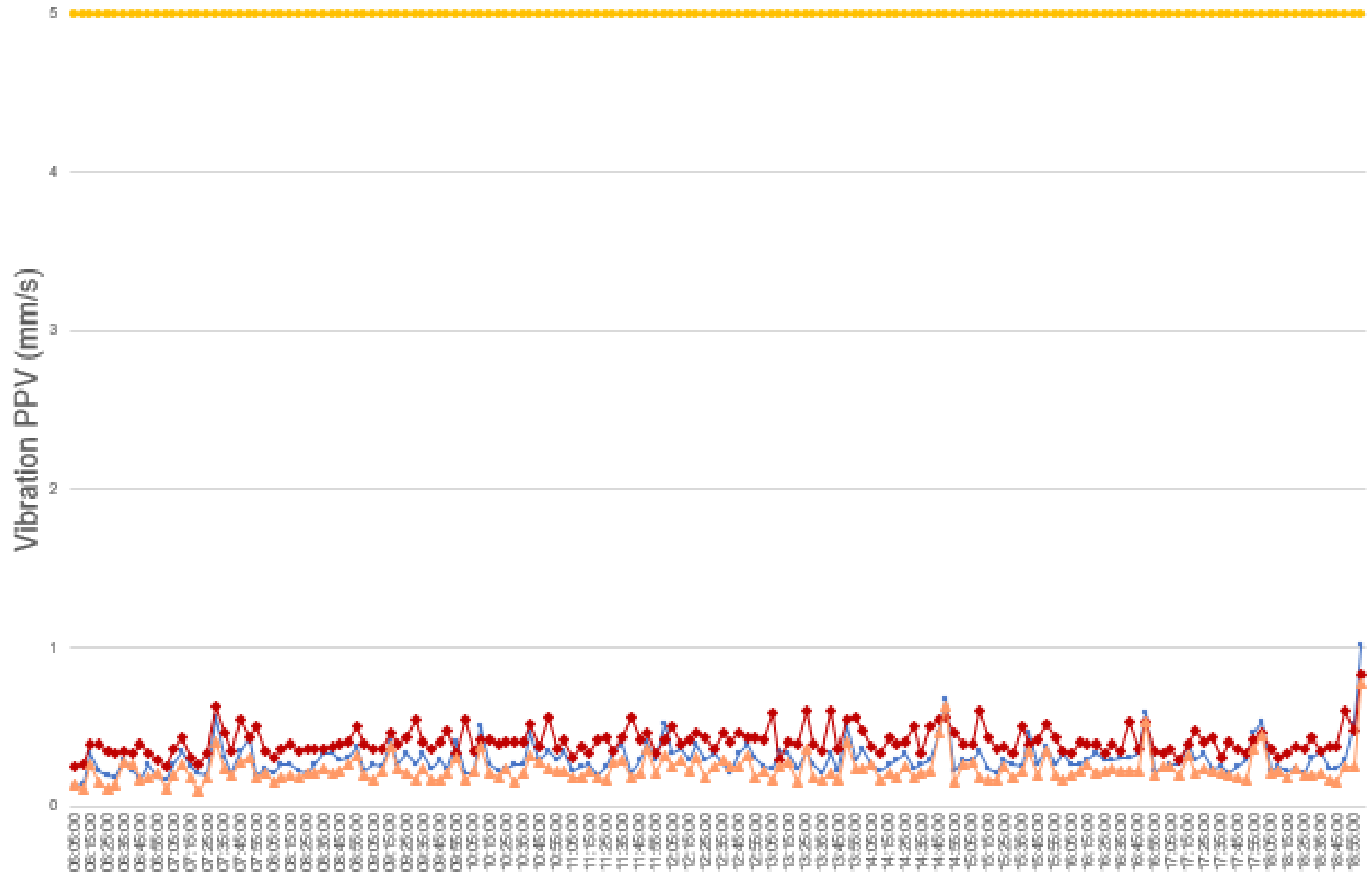
Vibration Monitoring: Friday 28/01/2022

—●— Radial (mm/s) —●— Transverse (mm/s) —●— Vertical (mm/s) —▲— Limit





— Radial (mm/s) — Transverse (mm/s) — Vertical (mm/s) — Limit

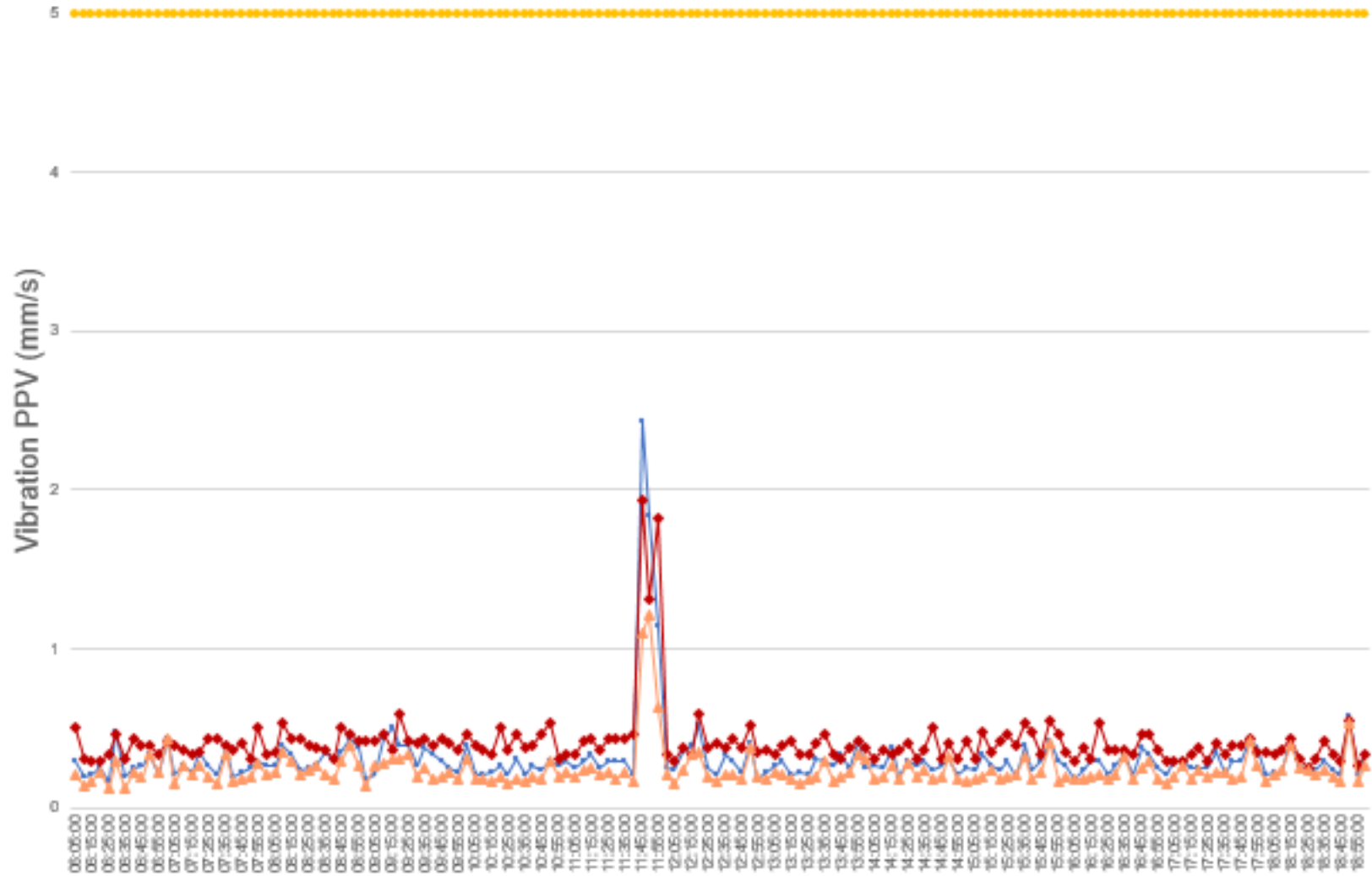




ACOUSTIC LOGIC

Vibration Monitoring: Sunday 30/01/2022

Radial (mm/s) Transverse (mm/s) Vertical (mm/s) Limit

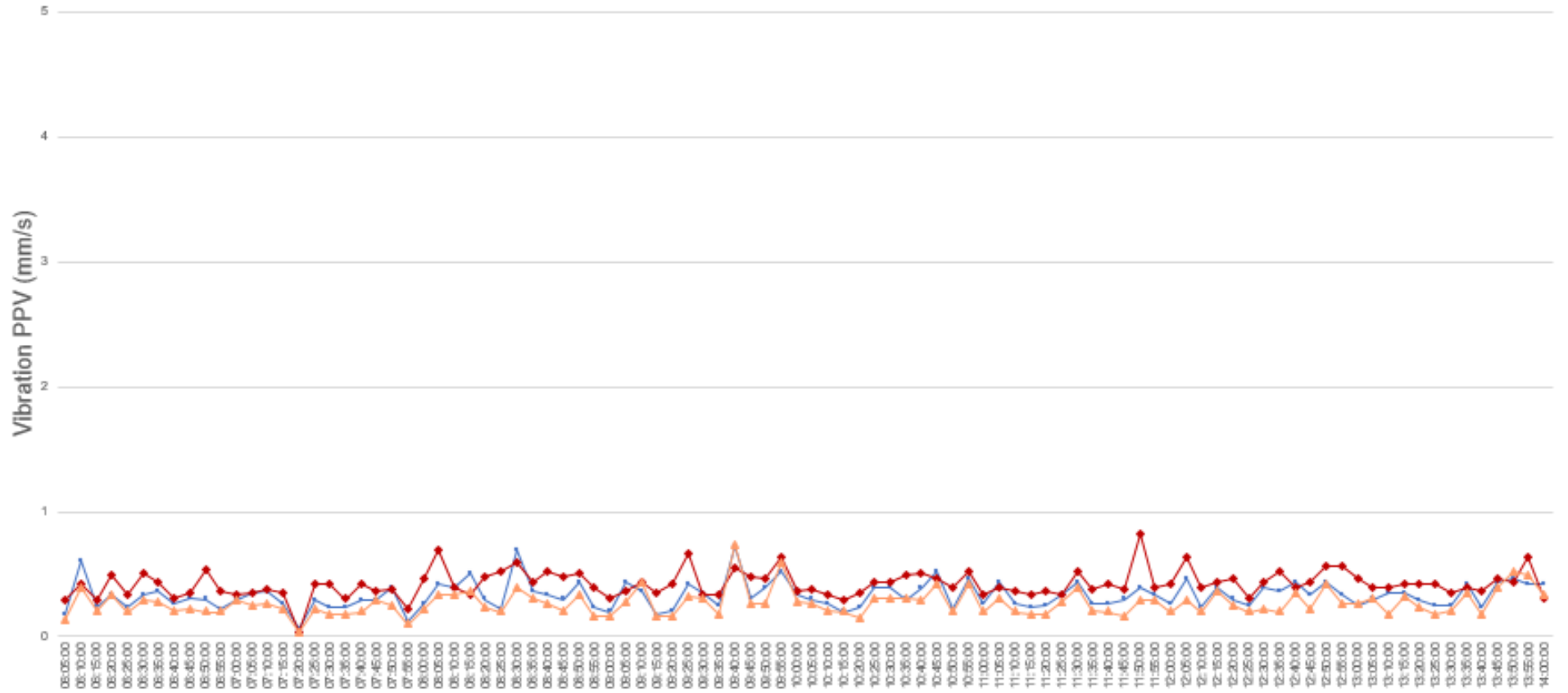




ACOUSTIC LOGIC

Vibration Monitoring: Monday 31/01/2022

— Radial (mm/s) — Transverse (mm/s) — Vertical (mm/s) — Limit



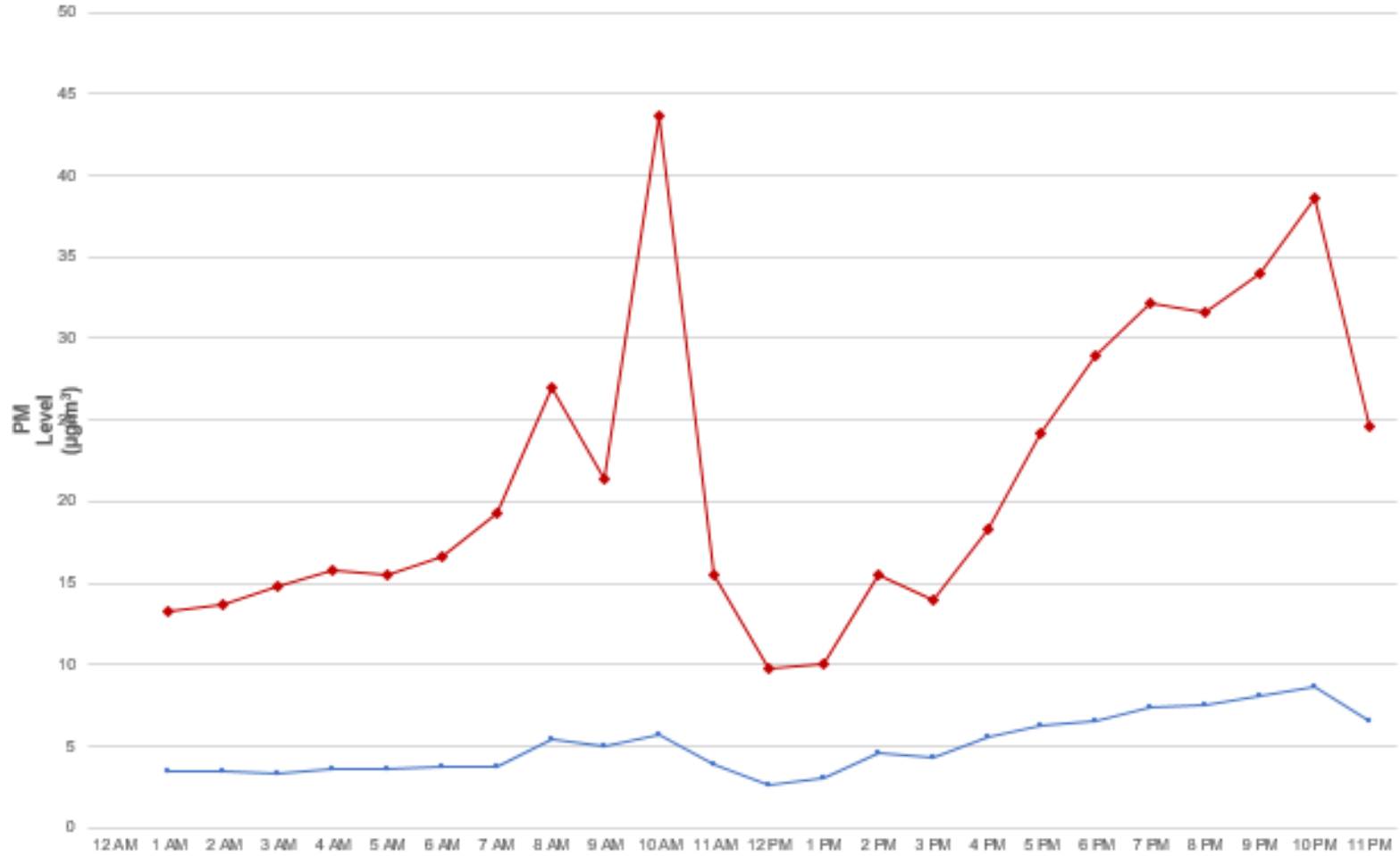
APPENDIX 3 – DUST MONITORING RESULTS



ACOUSTIC LOGIC

Dust Monitoring: 25/01/2022

— PM 2.5 — PM10

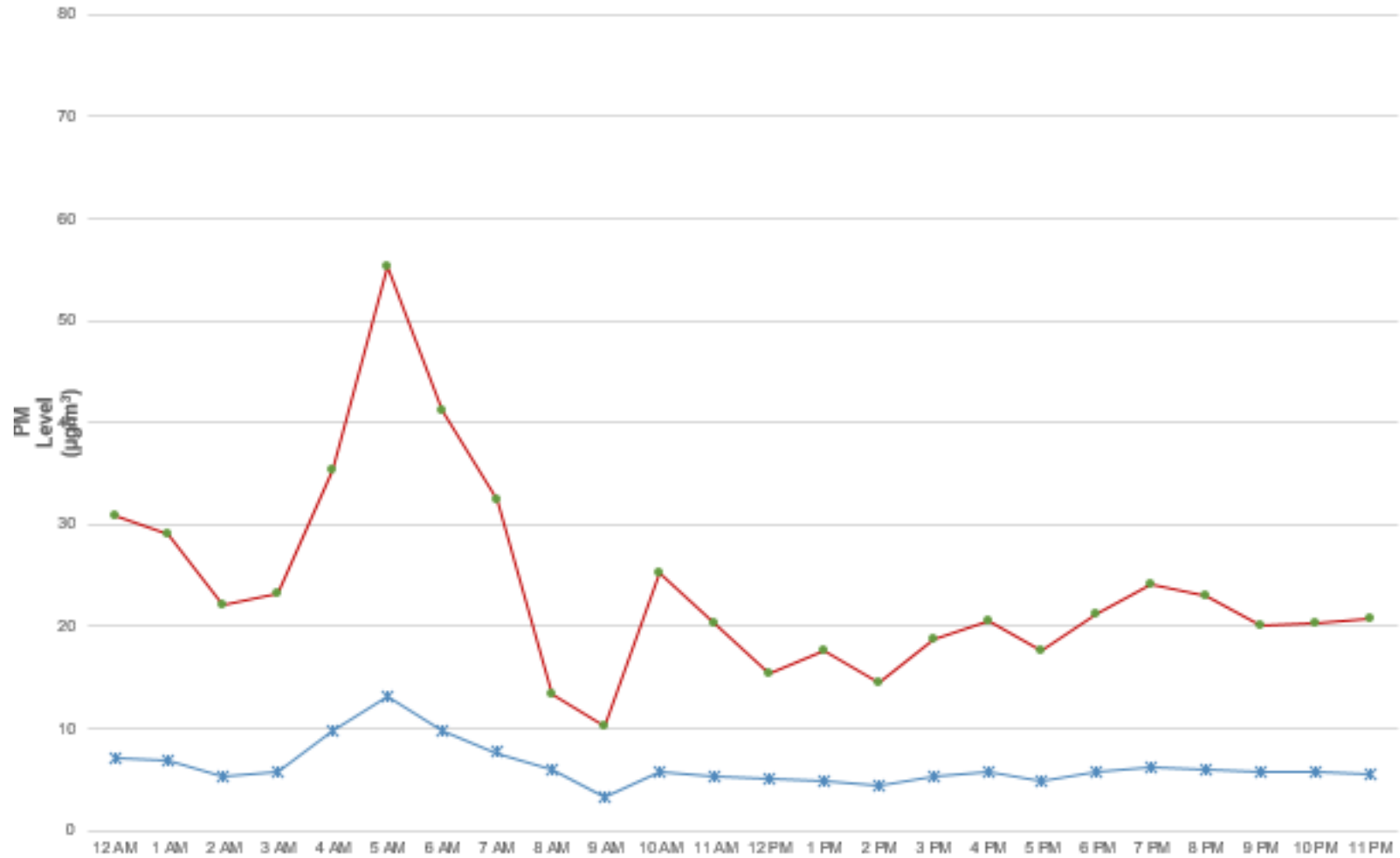




**ACOUSTIC
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Dust Monitoring: 26/01/2022

PM 2.5 PM10

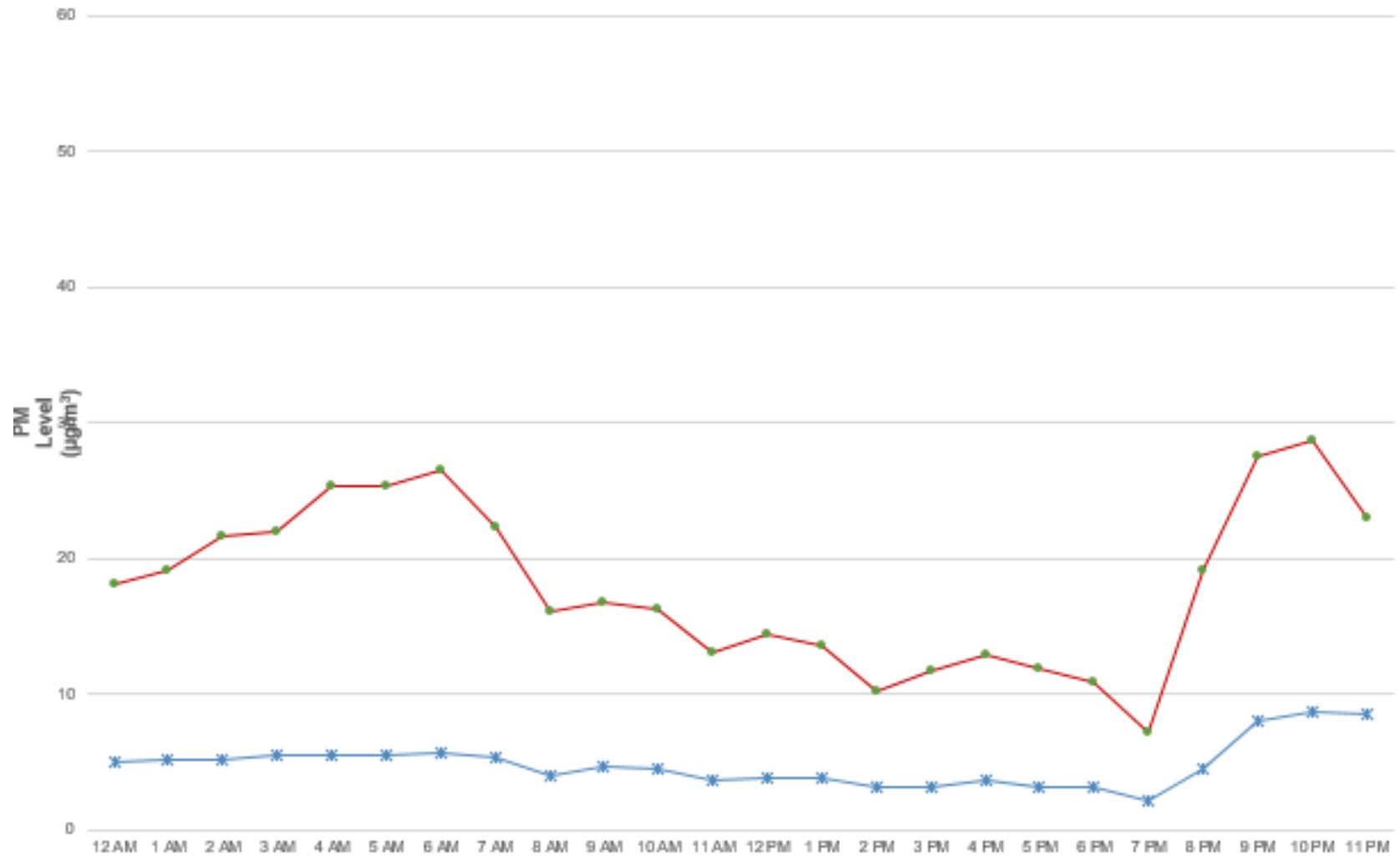




**ACOUSTIC
LOGIC**

Dust Monitoring: 27/01/2022

PM 2.5 PM10

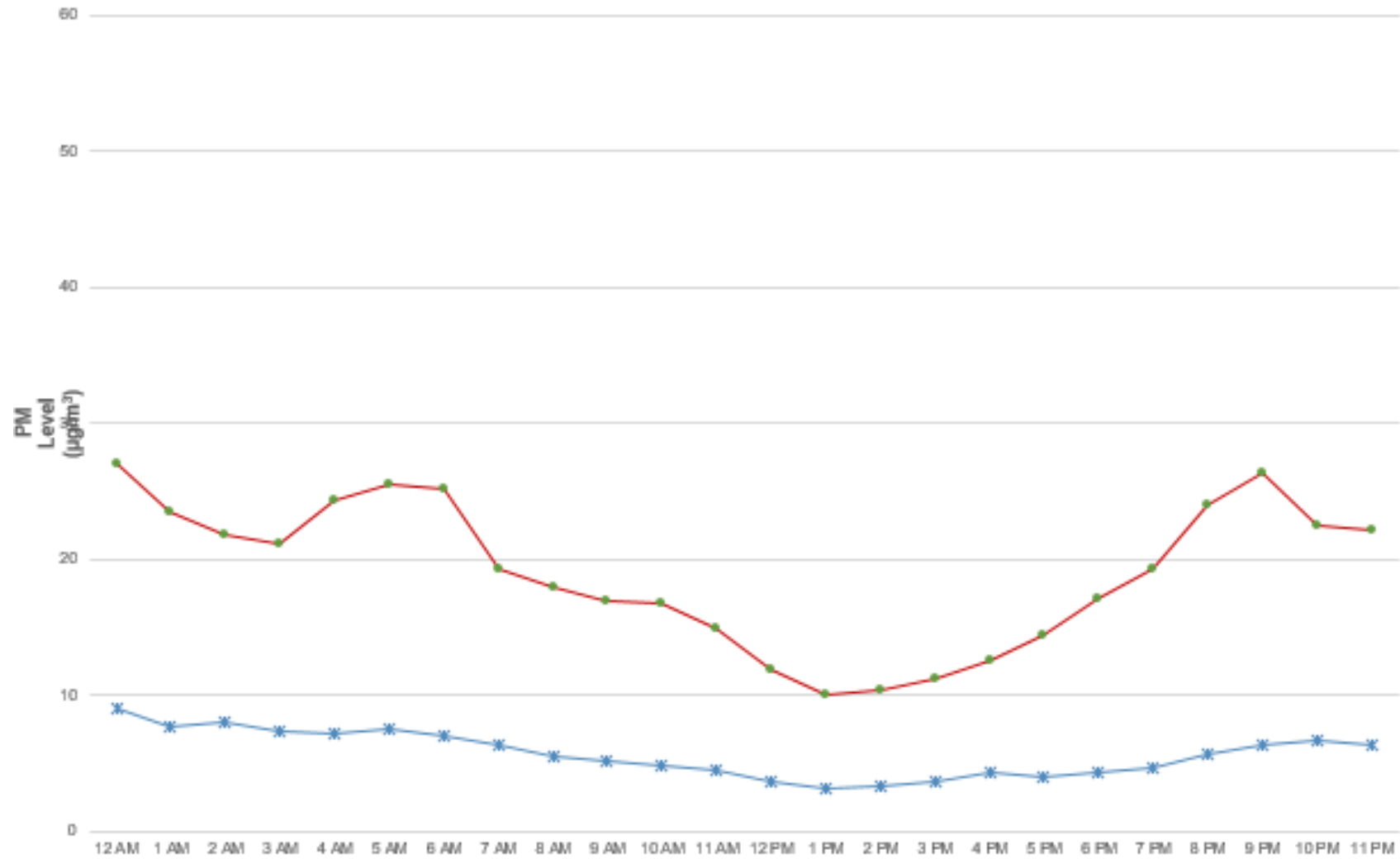




**ACOUSTIC
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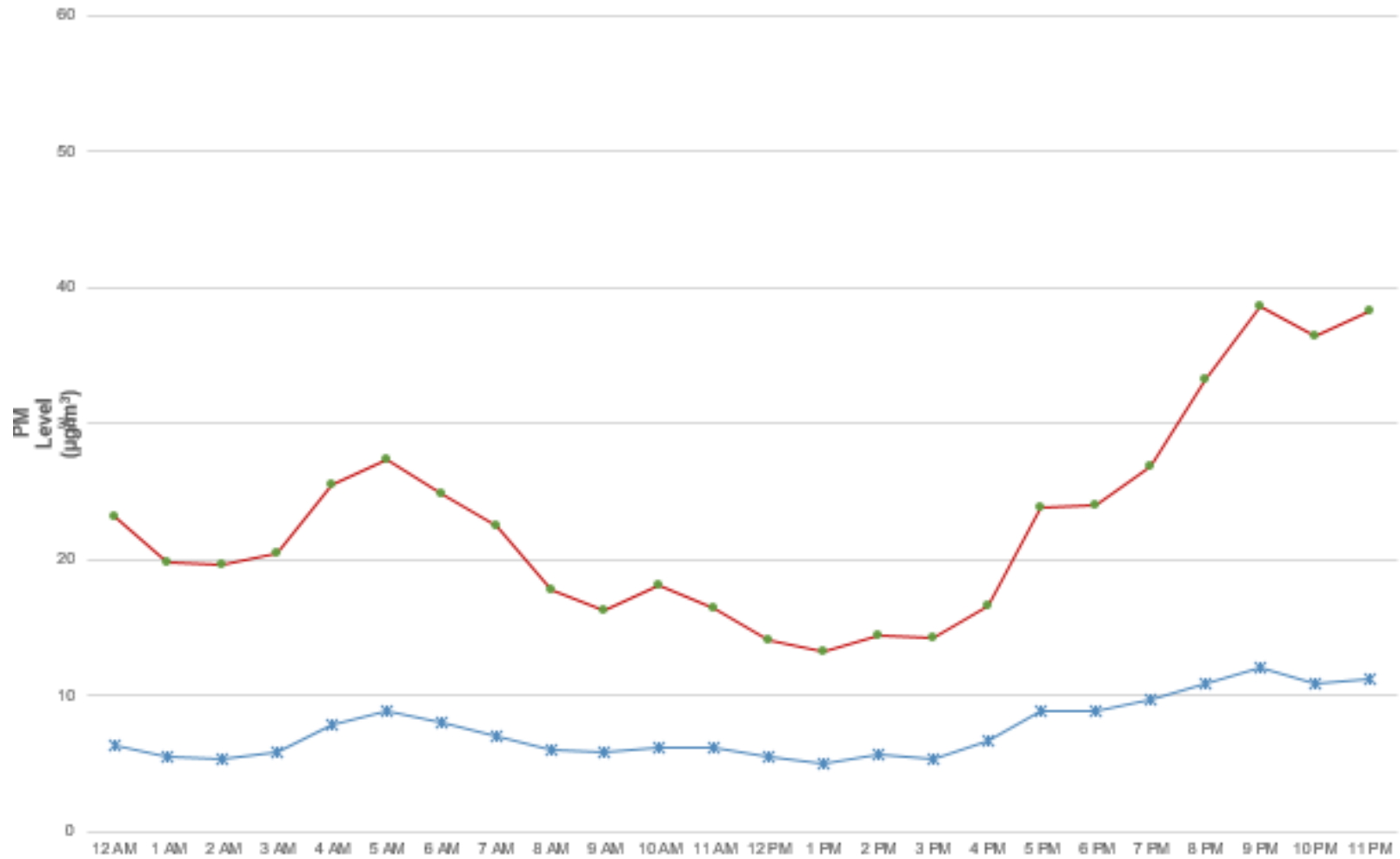
Dust Monitoring: 28/01/2022

PM 2.5 PM10





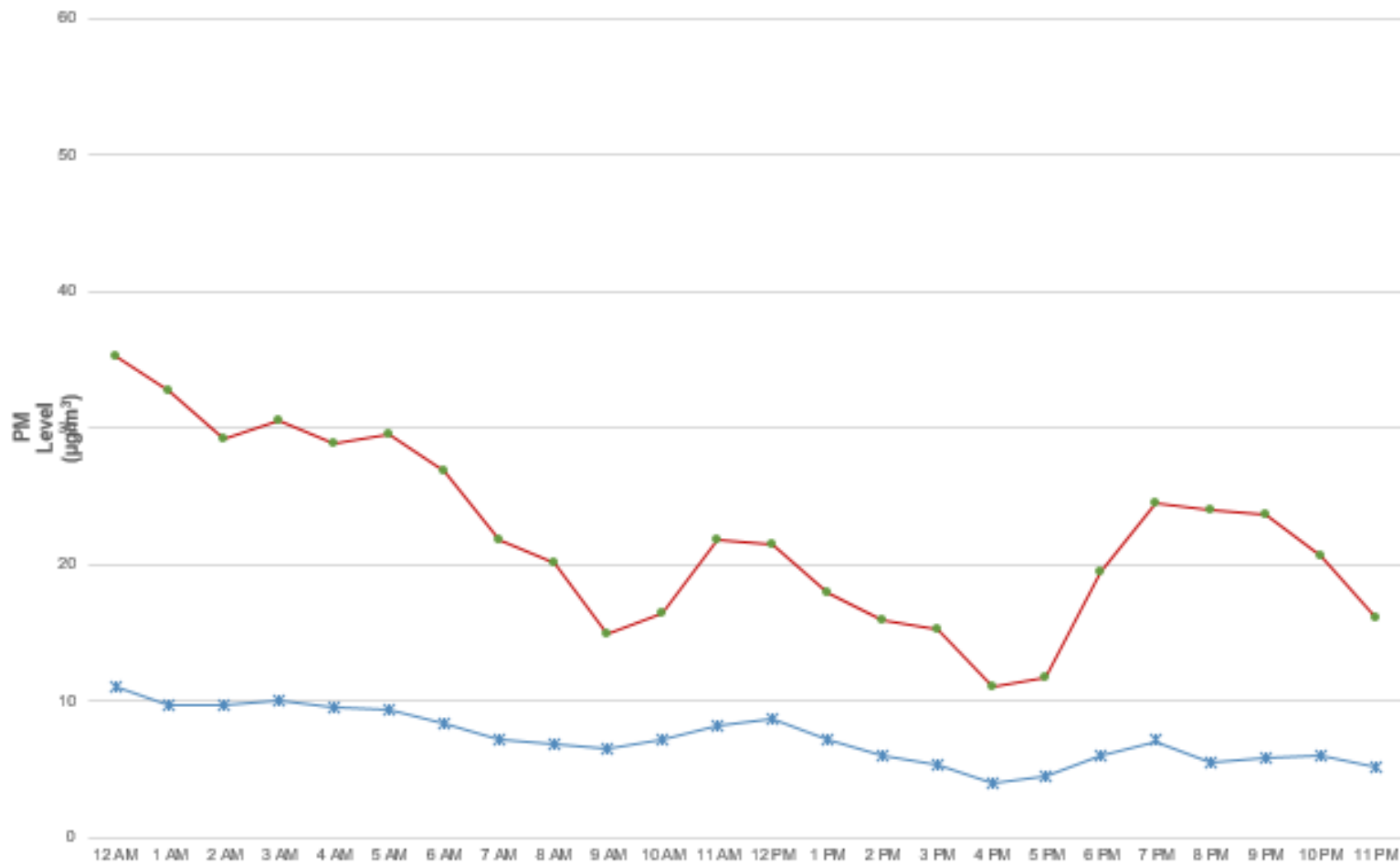
PM 2.5 PM10





Dust Monitoring: 30/01/2022

PM 2.5 PM10

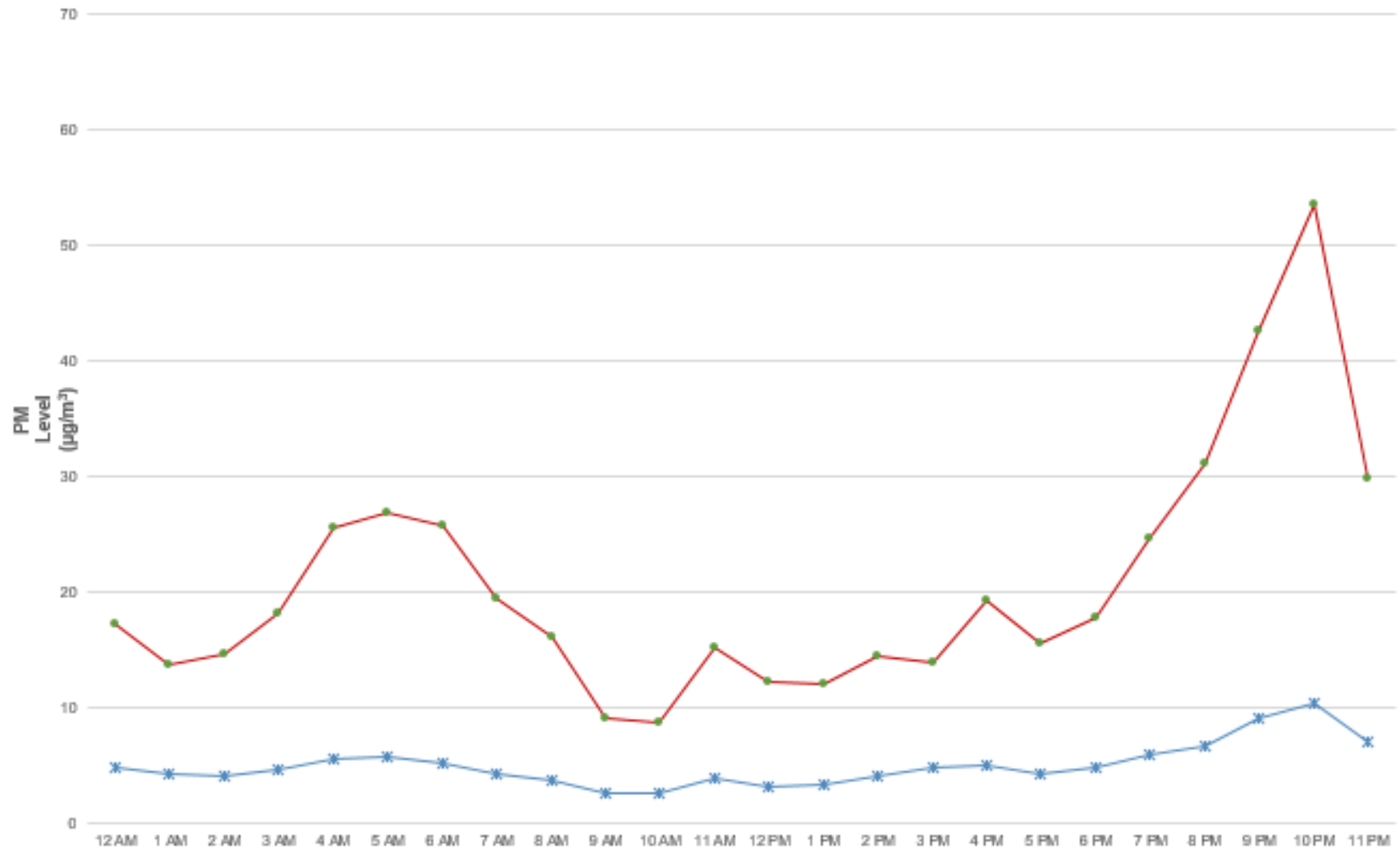




**ACOUSTIC
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Dust Monitoring: 31/01/2022

PM 2.5 PM10



APPENDIX 4 – SITE PHOTO OF MONITORING LOCATION



APPENDIX 5 – CALIBRATION CERTIFICATES



Hexanode Calibration Certificate

01 February 2022

Thankyou for choosing SiteHive for your realtime environmental management. This calibration certificate is valid for the device noted below.

Noise

The Hexanode sound level meter has been pressure calibrated by SiteHive using a NATA Certified (IEC 60942: Sound calibrators) Sound Level Calibrator, at 2 Foveaux Street, Surry Hills, NSW, 2010.

Serial Number	Calibration Date	Calibration Value
134	09 September 2021	3.3009

Accuracy:	Complies with precision requirements of IEC 61672 for Class 2
Acoustic overload point:	135 dBSPL
Frequency Range:	20 Hz ~ 12.5 kHz
Frequency Rating:	Z, A and C weighting
Parameters (dB):	Frequency and time weighted integrations, statistical levels, and more
Direction of Arrival:	Device angle & cartesian angle (0°-360°) of dominant noise source

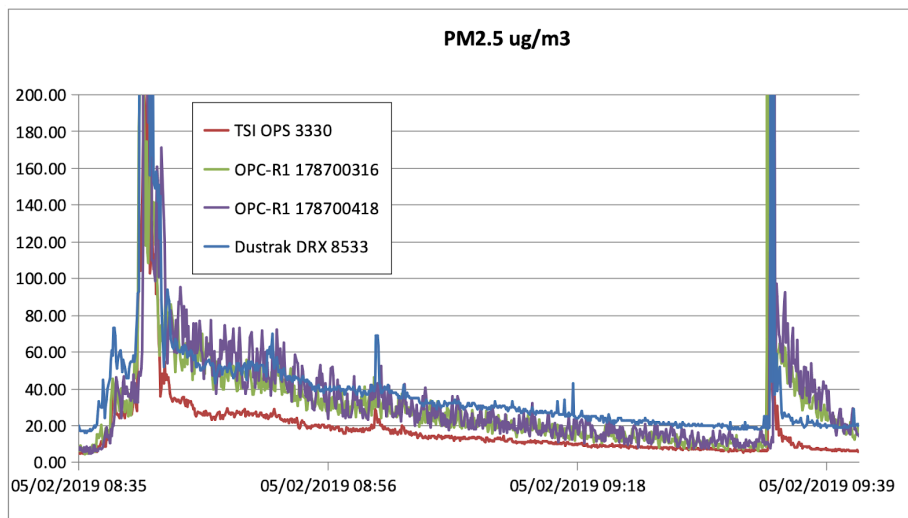
The SiteHive Hexanode uses innovative digital MEMS microphones, and as such cannot achieve full pattern approval in line with international standard IEC 61672, which is written for analogue condenser microphones. However, the SiteHive Hexanode sound level meter has been rigorously tested by the the [National Measurement Institute \(NMI\)](#), the division of the Australian Federal Government Department of Industry, Science, Energy & Resources responsible for providing world-class measurement services to support a fair, safe, healthy and competitive Australia. The National Measurement Institute's (NMI) [acoustic, ultrasound and vibration measurement services](#) are the most accurate in Australia, and include providing the certification for NATA (National Association of Testing Authorities) testing facilities, who provide class certification for noise meters. NMI undertook all of the possible tests outlined in IEC 61672-2, with the Hexanode passing all precision requirements within the criteria of a class 2 device.

Dust

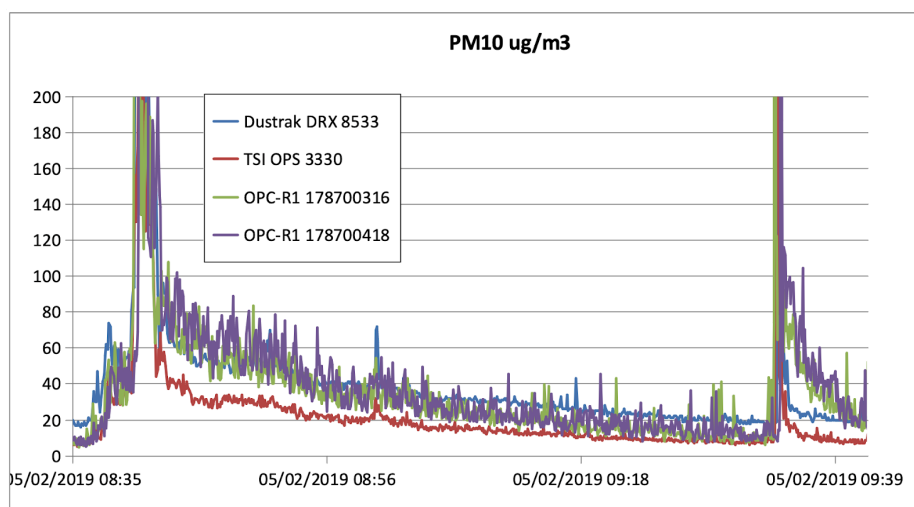
The Hexanode utilises the Alphasense R2 Optical Particle Sensor, to provide real-time dust measurements. Whilst the R2 does not have any gravimetric sampling capabilities, measurements can be adjusted using a K-Factor if one is available. SiteHive software will also provide measurements from the nearest Government air quality station for reference. The full data sheet for the R2 is available here. [Alphasense R2 Datasheet](#)

Particle range	μm spherical equivalent size (based on RI of 1.5)	0.30 to 12.4
Size categorisation	Number of software bins	16
Sampling interval	Histogram period (seconds)	2 to 30
Total flow rate	L/min (typical)	0.24
Max particle count rate	particles/second	10,000
Max coincidence probability	%concentration at 10^6 particles/L	0.7

Prior to deployment, the R2 is tested against [TSI Optical Particle Sizer 3330](#) and [DustTrak](#) instruments:



Left: Comparison of PM2.5 monitoring by OPC-R2 sensor and TSI OPS 3330 and DustTrak instruments. All are set at 5s averaging and are sampling the ambient air of a workshop, the raw 3330 data has been used to calculate a PM figure.



Left: Comparison of PM10 monitoring by OPC-R2 sensor and TSI OPS 3330 and DustTrak instruments. All are set at 5s averaging and are sampling the ambient air of a workshop, the raw 3330 data has been used to calculate a PM figure.

ETM CALIBRATION CERTIFICATE

#735720200206

DATE: 6/02/2020
SERIAL NUMBER: 7357

SERVICE NOTES:

As part of this Calibration service, the monitor, sensors and accessories were tested, and found to be functioning correctly.

CERTIFIED QUANTITIES:

Monitor electronics passed all calibration tests to within $\pm 2.0\%$.

Sensor	Sensitivity	Frequency	Tolerance
Geophone	28 mV/mm/s	63 Hz	± 1.2 mV/mm/s

GENERAL:

- (1) Instrument calibration measurements were performed with a Calibrated Multimeter.
- (2) Sensor calibration measurements were performed with a National Instruments 333 kS/s Multifunction I/O card Model PCI6052E.
- (3) Geophone sensitivity was determined by comparing the output from the geophones under test with that of a reference accelerometer.
- (4) Microphone sensitivity was determined by comparing the output from the microphone under test with that of a reference microphone.

CALIBRATION INSTRUMENTS USED:

	Type	Serial	Calibrated
(1) Multimeter	FLUKE 45	4764100	July 2019
(2) NI Multifunction I/O	PCI6052E	10A17EE	December 2019
(3) Vibration Reference Horizontal	PCB 333B50	44878	July 2019
(4) Vibration Reference Vertical	PCB 333B50	44877	July 2019

All instrument calibrations NATA Certified or traceable to the Australian Government National Measurement Institute.

Tests Performed by: 
(Calibration Station)

Date: 06/02/2020

Warranty on Calibration Services

Warranty

Our services come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are entitled to have the services provided again (without charge) if they are not of an acceptable quality and the failure does not amount to a major failure.

The benefits provided to the Customer by this Warranty are in addition to the other rights and remedies of the Customer under the Australian Consumer Law.

Exclusions

Any warranty that Texcel Pty Ltd is required to provide at law for its calibration services does not cover damage or defect resulting from:

- Abnormal Use by the customer including damage to the monitor, microphones, geophones, modem or any other external accessory resulting from Abnormal Use;
- unauthorised modifications, repairs or servicing of the Goods;
- internal corrosion due to condensation or water ingress into the Goods;
- the failure of any component of the monitor that was not replaced or serviced during the Calibration Service and is no longer covered under the original purchase warranty ; and
- the failure of any accessory product, such as the modem or microphone, that was not manufactured by Texcel.

Please note:

1. **Warning:** User-generated data which has been saved to this monitor may be lost as a result of the work performed during the calibration service or any other repair or maintenance. Customers are encouraged to save their data before the work is performed. Texcel will not be responsible for any data that is lost as a result of the works.
2. **Abnormal Use** includes use of the Goods in a manner for which they were not designed or a failure by the owner to ensure that the Goods are appropriately serviced, maintained and cared for.
3. **Goods** mean the Texcel monitoring system and attachments.

To: Sheran Nanayakkara **Technician:** Calibration Station

Acoustic Logic **Ref:** 9327

Date: 6/02/2020

Service Report 7357

Item	Description
1.	Calibrated monitor and sensors
2.	Supplied new software
3.	Upgraded firmware
Recommendations	1. Do NOT Leave the Monitor on charge all the time 2. Top-up charge the night before monitoring and/or every 3 months 3. Check configuration prior to monitoring

