Appendix I: Ambient Air Quality Test Report

TEST REPORT

Our Reference No.	:	**R251 0229/1**	Date of Monitoring	:	14/10/2025 to 28/10/2025
Project Code / Ref.	:	Tanjong Rimau	Date Reported	:	04/11/2025

Customer Ref. No.	:	-
Customer Name	:	Camphora Pte Ltd
Customer Address	:	5000A Marine Parade Road Block 5000A Singapore 449284
Attention To	:	Mr Derek Yap / Ms Sheryl Seet
Subject	:	**Air Quality Monitoring at Tanjong Rimau**
Description	:	Air Quality Monitoring at 2 locations between 14/10/2025 to 28/10/2025

Toh Teck Yeow

Snr Manager, Env Services

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3) MLS agrees to use reasonable diligence in the performance of the service.

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Website: www.mls.sg

SCOPE OF WORK

Baseline Ambient Air Monitoring was carried out at 2 locations from 14/10/2025 to 28/10/2025.

Table 1A: Test parameters and specifications

Locations	Parameters	Range of Detection	Limit of Detection	Data Interval
A1 A2	PM_{10}	0 - 10000 µg/m³	N.A.	10-min Avg
	$PM_{2.5}$	0 - 2000 µg/m³	N.A.	
	SO_2	0 - 10000 ppb	3 ppb	5-min Avg
	CO	0 - 12000 ppb	10 ppb	
	NO_2	0 - 5000 ppb	2 ppb	
	O_3	0 to 1800 ppb	3 ppb	

Note: N.A. indicates that there is no applicable LOD for the corresponding parameter.

Table 1B: Monitoring location details

Locations	Assigned Air Monitor	GPS Coordinates	Monitoring Period
A1	Kunak 3	1°15'34.5"N 103°48'26.8"E	22/10/2025 to 28/10/2025
A2	Kunak 3	1°15'24.8"N 103°48'32.4"E	14/10/2025 to 20/10/2025

MONITORING LOCATIONS

The monitoring location is shown in the Google Map image below. Refer to Appendix A for site photos.

SAMPLING METHODOLOGY AND EQUIPMENT

Kunak AIR Pro

PM10 and PM2.5 were monitored using Kunak AIR Pro (Kunak 3 Serial No: 0323380393). The Particulate Matter sensor consists of an Optical Particle Counter (OPC) capable of measuring particles from 0.3 µm up to 40 µm. PM1, PM2.5, PM4, PM10, Total Suspended Particles (TSP) and Total Particle Counter (TPC) are calculated assuming a particle density profile. The instrument is powered by solar. This instrument model is UKAS M-CERTS certified (certificate number: CSA MC230418/00). The gas sensors are individual electrochemical sensors for each of all 4 pollutants, providing real time concentration reading and data logging accessible online.

SINGAPORE AMBIENT AIR QUALITY TARGETS

Table 2: The following table summarises the Singapore Ambient Air Quality Guidelines

Pollutant	Singapore Long Term Targets
Particulate Matter ($PM_{2.5}$)	**24-hour mean: 25 µg/m³**
Particulate Matter (PM_{10})	**24-hour mean: 50 µg/m³**
Sulphur Dioxide (SO_2)	**24-hour mean: 20 µg/m³**
Carbon Monoxide (CO)	**8-hour mean: 10 mg/m³**
	1-hour mean: 30 mg/m³
Nitrogen Dioxide (NO_2)	**1-hour mean: 200 µg/m³**
Ozone (O_3)	**8-hour mean: 100 µg/m³**

MONITORING RESULTS

The results were summarised in the following tables. Raw air quality data are submitted electronically.

Table 3: Summary of 24-hour mean for PM_{10} and $PM_{2.5}$ for A1

Pollutants		PM_{10}	$PM_{2.5}$
Averaging Period		24 hours	
Unit		µg/m³	
24-hr mean Pollutant concentrations for each day	22-Oct-25	5.6	2.3
	23-Oct-25	8.4	2.8
	24-Oct-25	9.0	3.0
	25-Oct-25	8.7	2.8
	26-Oct-25	7.6	4.0
	27-Oct-25	10.4	5.9
	28-Oct-25	12.3	7.2
Singapore's Ambient Air Quality Long Term Targets		50	25

Table 4: Summary of Maximum Gas Pollutant Concentrations for each day at A1

Pollutants		CO	CO	NO_2	SO_2	O_3
Averaging Period		1 hour	8 hours	1 hour	24 hours	8 hours
Unit		mg/m³		µg/m³		
Maximum Pollutant concentrations for each day and Daily Average SO_2 concentrations	22-Oct-25	0.35	0.22	68.7	< 8	53.4
	23-Oct-25	0.22	0.19	57.0	< 8	51.2
	24-Oct-25	0.25	0.22	51.6	< 8	45.6
	25-Oct-25	0.38	0.23	55.7	< 8	47.5
	26-Oct-25	0.36	0.23	59.9	< 8	57.5
	27-Oct-25	1.13	0.33	62.3	19.7	22.1
	28-Oct-25	0.48	0.30	68.0	< 8	55.8
Max over 7 days		1.13	0.33	68.7	19.7	57.5
Singapore's Ambient Air Quality Long Term Targets		**30**	**10**	**200**	**20**	**100**

Table 5: Summary of 24-hour mean for PM_{10} and $PM_{2.5}$ for A2

Pollutants		PM_{10}	$PM_{2.5}$
Averaging Period		24 hours	
Unit		µg/m³	
24-hr mean Pollutant concentrations for each day	14-Oct-25	8.9	5.4
	15-Oct-25	6.5	3.8
	16-Oct-25	11.9	6.1
	17-Oct-25	12.1	7.3
	18-Oct-25	10.2	5.7
	19-Oct-25	9.4	4.5
	20-Oct-25	8.6	3.2
Singapore's Ambient Air Quality Long Term Targets		**50**	**25**

Table 6: Summary of Maximum Gas Pollutant Concentrations for each day at A2

Pollutants		CO	CO	NO_2	SO_2	O_3
Averaging Period		1 hour	8 hours	1 hour	24 hours	8 hours
Unit		mg/m^3		$\mu g/m^3$		
Maximum Pollutant concentrations for each day and Daily Average SO_2 concentrations	14-Oct-25	0.28	0.22	67.4	< 8	64.6
	15-Oct-25	0.21	0.19	55.9	< 8	54.8
	16-Oct-25	0.58	0.36	80.3	44.2	58.5
	17-Oct-25	0.58	0.36	84.3	12.2	89.0
	18-Oct-25	0.83	0.30	110.4	46.6	87.2
	19-Oct-25	0.39	0.27	73.6	< 8	56.4
	20-Oct-25	0.24	0.20	63.1	< 8	57.6
Max over 7 days		0.83	0.36	110.4	46.6	89.0
Singapore's Ambient Air Quality Long Term Targets		**30**	**10**	**200**	**20**	**100**

Note:

1) The dates represent data collected between 0000hrs to 2359hrs.
2) The SO_2 data presented for each of the day is the daily average based on the above-mentioned time period.

Photos: Ambient Air Monitoring Station at A1 (22/10/2025 to 28/10/2025)

Photos: Ambient Air Monitoring Station at A2 (14/10/2025 to 20/10/2025)

MCERTS Certificate for Kunak AIR Pro

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

Kunak AIR Pro

Manufactured by:

Kunak Technologies SL
Parque Empresarial La Muga, 9
Floor 4, Office 1 – Orcoyen
Navarra
Spain

has been assessed by CSA Group
and for the conditions stated on this certificate complies with:

MCERTS Performance Standards for Indicative Ambient Particulate Monitors, Environment Agency, August 2017, version 4

Certification ranges:

$PM_{2.5}$ 0-1,500 µg/m³
PM_{10} 0-2,000 µg/m³

Project No.:	80150788
Certificate No:	CSA MC230418/00
Initial Certification:	9 June 2023
This Certificate issued:	9 June 2023
Renewal Date:	8 June 2028

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

CSA Group Testing UK Ltd
Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CH5 3US
Tel: +44 (0)1244 670 900

UKAS PRODUCT CERTIFICATION 0011

Form 1335
Issue 11

Certificate Contents

Approved Site Application

Any potential user should make sure, in consultation with the manufacturer, that the monitoring system is suitable for the intended application. For general guidance on monitoring techniques refer to the Environment Agency guidance available at www.mcerts.net

The indicative dust monitoring analyser(s) can be operated in one of two ways:

For qualitative measurements: Providing qualitative measurement data for the analysis of particulate pollution trends, and source identification studies based for example on pollution roses etc. Such application can rely on instrument factory calibration only.

For quantitative measurements: Providing measurement data with the uncertainty defined for indicative instruments (+/- 50%). This can be achieved on condition that each instrument used for measurement has been calibrated on the specific site where monitoring is taking place against a standard reference method for a period of two weeks and the resulting slope and intercept have been used for instrument calibration. Using non-standard filters and procedures for this purpose is not acceptable. To maintain the validity of data this calibration has to be repeated at least every twelve months or when the instrument is moved to a different site.

They **cannot** be used on national automatic monitoring networks for compliance reporting against the Ambient Air Quality Directives.

The field tests were carried out from the 1 April 2022 to the 7 February 2023 on two candidate 'Kunak AIR Pro' samplers, collocated with a Palas Fidas 200 (the reference method). The location of the field test was University of Manchester, Fallowfield, Manchester, UK. The serial numbers of the two 'Kunak AIR Pro' monitors were '0321 180036' and '0321 180037'.

Basis of Certification

This certification is based on the following test report(s) and on CSA Group's assessment and ongoing surveillance of the product and the manufacturing process:

Bureau Veritas, test report ref. AIR17810339, dated June 2023, "Kunak, Test of the Air Pro for use as an Indicative Monitor for PM_{10} and $PM_{2.5}$"

Product Certified

The 'Kunak AIR Pro' measuring system consists of the following parts:

- Base Station includes data storage with eSIM cellular communications.
- Power Pack embedded in the base station.
- Particulate sensor cartridge to measure $PM_{2.5}$ and PM_{10}.
- Solar protected shield.

Sensor type and firmware version
Alphasense OPC-N3 with firmware version 1.32.DT

Algorithm Version (note 5.)
KAIR_OPCN3_31

The particle firmware - Senor type OPC-N3 firmware version 1.17a.B with algorithm version KAIR_OPCN3_30.

This certificate applies to all instruments fitted with serial number 0321 180037 onwards.

Certified Performance

Test (*Laboratory*)	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Constancy of the sample volumetric flow					Not applicable Note 1	To remain constant within ± 3%
Tightness of the sampling system			1.44%			Leakage not to exceed 2% of sampled volume

Certificate No: CSA MC230418/00
This Certificate issued: 9 June 2023

Test (Field)	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Intra-instrument uncertainty for the reference method						
PM_{10}					0.33µg/m³	≤2.5µg/m³
$PM_{2.5}$					0.25µg/m³	≤2.5µg/m³
Intra-instrument uncertainty for the candidate method						
PM_{10}						
All data (n=306)					1.74µg/m³	≤5µg/m³ for all data as well as for the subsets: < or ≥ 30 µg/m³
≥ 30 µg/m³ (n=4)					2.47µg/m³	
< 30 µg/m³ (n=302)					1.74µg/m³	
$PM_{2.5}$						
All data (n=306)					0.81µg/m³	≤5µg/m³ for all data as well as for the subsets: < or ≥ 30 µg/m³
≥ 18 µg/m³ (n=14)					1.64µg/m³	
< 18 µg/m³ (n=292)					0.75µg/m³	
Highest resulting uncertainty estimate comparison against data quality objective (Measurement Uncertainty)						$W_{CM} \leq 50\%$ $W_{CM} \leq W_{dqo}$ (W_{dqo} Measurement uncertainty defined as 50% for indicative instruments)
PM_{10}						
All data (n=306)					81.1%	
All data (slope corrected) (n=306)					12.2% (note 2)	
≥ 30 µg/m³ (slope corrected) (n=4)					46.6%	
$PM_{2.5}$						
All data (n=306)					67.0%	
All data (slope corrected) (n=306)					10.6% (note 3)	
≥ 18 µg/m³ (slope corrected) (n=14)					40.9% (note 3)	
Maintenance Interval					44 weeks Note 4	≥2 weeks

Note 1 - The Kunak AIR Pro utilises a fan and not a pump, therefore it was agreed that this test was not applicable.
Note 2 - This data was slope corrected by dividing by 0.596. All users must slope correct PM 10 data by dividing by 0.596 - it is recommended that the manufacturer program this value into their algorithm in order to avoid confusion to end users. End users should check with the manufacturers that this has been carried out.
Note 3 - This data was slope corrected by dividing by 0.667. All users must slope correct $PM_{2.5}$ data by dividing by 0.667 - it is recommended that the manufacturer program this value into their algorithm in order to avoid confusion to end users. End users should check with the manufacturers that this has been carried out.
Note 4 - Maintenance - the manufacturer recommends that users clean the PM inlet if it becomes dirty. If a problem arises, such as sensor malfunction or obstruction, then the software will detect it automatically and will invalidate the measurements and advise the user to carry out specific maintenance. It is further recommended to change the PM sensor after 2 years operation.
Note 5 - The Kunak AIR Pro must be set up using the configuration, as follows; i) Alphasense OPC-N3 sensor with firmware version '1.32.DT', and ii) Algorithm version: KAIR_OPCN3_31. The firmware version incorporates slope correction – firmware version '31' is approved and no slope correction required.

Certificate No: CSA MC230418/00
This Certificate issued: 9 June 2023

Description

The Kunak AIR Pro has a particulate matter sensor that consists of an optical particle counter (OPC) capable of measuring particles from 0.3µm up to 40µm. $PM_{2.5}$ and PM_{10} are calculated assuming a particle density profile.
The effect of humidity is corrected using the embedded algorithm. The particle size distributions are available on Kunak Cloud.

The Kunak AIR Pro communicates using GPRS, 3G, 4G, ethernet and Modbus RTE Slave. Secure encryption and direct communication protocols, results in bi-directional communications and facilitates remote configuration, firmware update and sensor calibration of the devices through the Kunak Cloud web platform.

Kunak AIR Pro is equipped with an internal rechargeable battery. The battery can be powered either through a small solar panel to facilitate the installation of the device or by an outdoor charger to via the main network.

General Notes

1. This certificate is based upon the equipment tested. The Manufacturer is responsible for ensuring that on-going production complies with the standard(s) and performance criteria defined in this certificate. The manufacturer is required to maintain an approved quality management system controlling the manufacture of the certified product. Both the product and the quality management system shall be subject to regular surveillance according to 'Regulations Applicable to the Holders of CSA Group Testing UK Ltd Certificates'.

2. The design of the product certified is defined in the CSA Group design schedule V00 for certificate no. CSA MC230418/00.

3. If a certified product is found not to comply, CSA Group should be notified immediately at the address shown on this certificate.

4. The certification marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of CSA Group Testing UK Ltd Certificates'.

5. This document remains the property of CSA Group and shall be returned when requested by CSA Group.

Certificate No: CSA MC230418/00
This Certificate issued: 9 June 2023

Gas Sensors Calibration Certificates for Kunak AIR Pro (Kunak 3)

Characterization and Calibration Certificate

kunak

CHARACTERIZATION AND CALIBRATION CERTIFICATE

KUNAK TECHNOLOGIES S.L., as manufacturer of the product, certifies that the cartridge meets the internal manufacturing quality conditions, as well as the laboratory tests and the correct calibration of the cartridges according to the QA&QC proccedings.

Cartridges are tested according to the laboratory pre-test specified in CEN/TS 17660-1:2021 "Air quality - Performance evaluation of air quality sensor systems - Part 1: Gaseous pollutants in ambient air", regarding the Response Time (t90), Limit of Detection (LOD) and Repeatability (Rep).

CERTIFIED CARTRIDGE

Cartridge type:	Sulphur dioxide (SO2)	**Manufacture Date:**	2023-10-05
P/N:	K-SO2-A-01	**Expiry Date:**	2025-12-04
S/N:	3523320115		

TEST 1: ENVIRONMENTAL CHARACTERIZATION TEST

Typical baseline error in the whole temperature (<45ºC) and humidity range.

Test	Cartridge S/N	Test results	Kunak requirement	STATUS
Environmetal characterization	3523320115	20.54 ppb	< 30 ppb	PASS

TEST 2: LABORATORY TEST

The Response Time, the Limit of Detection and the Repeatability of the cartridge are calculated using certified gas bottles according to the CEN/TS 17660-1:2021.

- **Response Time:** The response time of the sensor systems is estimated using t90 (the time required for the sensor system to reach 90% of the final stable value).
- **Limit of Detection:** Value of the measured quantity that gives the probability of falsely asserting the absence or presence of a component.
- **Repeatability:** closeness of the agreement between the results of successive measurements of the same measure and carried out under the same conditions of measurement.

Test	Cartridge S/N	Kunak requirement	TS 17660-1:2021 requirement	STATUS
Response Time	3523320115	< 120 s	< 360 s	PASS
Limit of Detection	3523320115	< 3 ppb	< 10 ppb	PASS
Repeatability	3523320115	< 4 ppb	< 4 ppb	PASS

REMARKS

The results indicated refer exclusively to the cartridge subjected to the characterization and laboratory tests and described in this certificate.

Signature:

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Cartridges are tested according to the laboratory pre-test specified in CEN/TS 17660-1:2021 "Air quality - Performance evaluation of air quality sensor systems - Part 1: Gaseous pollutants in ambient air", regarding the Response Time (t90), Limit of Detection (LOD) and Repeatability (Rep).

CERTIFIED CARTRIDGE

Cartridge type:	Ozone (O3)	**Manufacture Date:**	2023-10-05
P/N:	K-O3-A-01	**Expiry Date:**	2025-12-04
S/N:	3323320174		

TEST 1: ENVIRONMENTAL CHARACTERIZATION TEST

Typical baseline error in the whole temperature (<45ºC) and humidity range.

Test	Cartridge S/N	Test results	Kunak requirement	STATUS
Environmetal characterization	3323320174	5.29 ppb	< 12 ppb	PASS

TEST 2: LABORATORY TEST

The Response Time, the Limit of Detection and the Repeatability of the cartridge are calculated using certified gas bottles according to the CEN/TS 17660-1:2021.

- **Response Time:** The response time of the sensor systems is estimated using t90 (the time required for the sensor system to reach 90% of the final stable value).
- **Limit of Detection:** Value of the measured quantity that gives the probability of falsely asserting the absence or presence of a component.
- **Repeatability:** closeness of the agreement between the results of successive measurements of the same measure and carried out under the same conditions of measurement.

Test	Cartridge S/N	Kunak requirement	TS 17660-1:2021 requirement	STATUS
Response Time	3323320174	< 120 s	< 360 s	PASS
Limit of Detection	3323320174	< 3 ppb	< 10 ppb	PASS
Repeatability	3323320174	< 4 ppb	< 4 ppb	PASS

REMARKS

The results indicated refer exclusively to the cartridge subjected to the characterization and laboratory tests and described in this certificate.

Signature:

KUNAK TECHNOLOGIES, S.L.
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KUNAK TECHNOLOGIES S.L., as manufacturer of the product, certifies that the cartridge meets the internal manufacturing quality conditions, as well as the laboratory tests and the correct calibration of the cartridges according to the QA&QC proccedings.

Cartridges are tested according to the laboratory pre-test specified in CEN/TS 17660-1:2021 "Air quality - Performance evaluation of air quality sensor systems - Part 1: Gaseous pollutants in ambient air", regarding the Response Time (t90), Limit of Detection (LOD) and Repeatability (Rep).

CERTIFIED CARTRIDGE

Cartridge type:	Nitrogen dioxide (NO2)	**Manufacture Date:**	2023-10-05
P/N:	K-NO2-A-01	**Expiry Date:**	2025-12-04
S/N:	3223320225		

TEST 1: ENVIRONMENTAL CHARACTERIZATION TEST

Typical baseline error in the whole temperature (<45ºC) and humidity range.

Test	Cartridge S/N	Test results	Kunak requirement	STATUS
Environmetal characterization	3223320225	9.98 ppb	< 20 ppb	PASS

TEST 2: LABORATORY TEST

The Response Time, the Limit of Detection and the Repeatability of the cartridge are calculated using certified gas bottles according to the CEN/TS 17660-1:2021.

- **Response Time:** The response time of the sensor systems is estimated using t90 (the time required for the sensor system to reach 90% of the final stable value).
- **Limit of Detection:**Value of the measured quantity that gives the probability of falsely asserting the absence or presence of a component.
- **Repeatability:** closeness of the agreement between the results of successive measurements of the same measure and carried out under the same conditions of measurement.

Test	Cartridge S/N	Kunak requirement	TS 17660-1:2021 requirement	STATUS
Response Time	3223320225	< 120 s	< 360 s	PASS
Limit of Detection	3223320225	< 3 ppb	< 10 ppb	PASS
Repeatability	3223320225	< 4 ppb	< 4 ppb	PASS

REMARKS

The results indicated refer exclusively to the cartridge subjected to the characterization and laboratory tests and described in this certificate.

Signature:

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KUNAK TECHNOLOGIES S.L., as manufacturer of the product, certifies that the cartridge meets the internal manufacturing quality conditions, as well as the laboratory tests and the correct calibration of the cartridges according to the QA&QC proccedings.

Cartridges are tested according to the laboratory pre-test specified in CEN/TS 17660-1:2021 "Air quality - Performance evaluation of air quality sensor systems - Part 1: Gaseous pollutants in ambient air", regarding the Response Time (t90), Limit of Detection (LOD) and Repeatability (Rep).

CERTIFIED CARTRIDGE

Cartridge type:	Carbon monoxide (CO)	**Manufacture Date:**	2023-10-04
P/N:	K-CO-A-01	**Expiry Date:**	2025-12-04
S/N:	3023360149		

TEST 1: ENVIRONMENTAL CHARACTERIZATION TEST

Environmetal characterization test - not required for Carbon monoxide (CO) cartridges.

TEST 2: LABORATORY TEST

The Response Time, the Limit of Detection and the Repeatability of the cartridge are calculated using certified gas bottles according to the CEN/TS 17660-1:2021.

- **Response Time:** The response time of the sensor systems is estimated using t90 (the time required for the sensor system to reach 90% of the final stable value).
- **Limit of Detection:** Value of the measured quantity that gives the probability of falsely asserting the absence or presence of a component.
- **Repeatability:** closeness of the agreement between the results of successive measurements of the same measure and carried out under the same conditions of measurement.

Test	Cartridge S/N	Kunak requirement	TS 17660-1:2021 requirement	STATUS
Response Time	3023360149	< 30 s	< 360 s	PASS
Limit of Detection	3023360149	< 10 ppb	< 150 ppb	PASS
Repeatability	3023360149	< 20 ppb	< 50 ppb	PASS

REMARKS

The results indicated refer exclusively to the cartridge subjected to the characterization and laboratory tests and described in this certificate.

Signature:

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Appendix J: MLS technical memorandum

Technical Memo

To: Mr Benedict Chow

From: Toh Teck Yeow

Date: October 28, 2025

Re: Colocation for Kunak Air Pro (KAP#03) deployed for Air Quality Monitoring at Tanjong Rimau

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General Information

Period of colocation: 4-Sep-25 to 11-Sep-25

Location: Marine Terrace HDB Estate

Equipment ID: KAP#03 (SN 0323380393)

Reference Instruments:

Parameter	*Equipment Model*	*Equipment SN*
Particulate Matter - PM_{10}	Met One BAM-1020	S/N: 11578
Particulate Matter - $PM_{2.5}$	Met One BAM-1020	S/N: 11576
Carbon Monoxide – CO	Horiba APMA370	S/N: XYR0U0PS
Nitrogen Dioxide – NO_2	Horiba APNA370	S/N: WJMMV3BU
Ozone – O_3	Horiba APOA370	S/N: P1VC78B7
Sulphur dioxide – SO_2	Horiba APSA370	S/N: EZ20230512

Summary of Kunak 3 correlation analysis for all pollutants based on hourly average

Parameter	Number of data points (n)	Gain	Offset	r value
Particulate Matter - PM_{10}	170	1.6279	0.4795	0.873
Particulate Matter - $PM_{2.5}$	171	1.4389	-0.4155	0.858
Carbon Monoxide – CO	184	0.8416	-0.1043	0.968
Nitrogen Dioxide – NO_2	178	1.1026	-19.601	0.847
Ozone – O_3	168	1.524	2.716	0.858
Sulphur dioxide – SO_2	176	0.2329	8.3025	0.804

Appendix K: Ground Vibration Test Report

MLS

TEST REPORT

Our Reference No.	:	**R251 0229/2**	Date of Monitoring	:	14/10/2025 & 16/10/2025
Project Code / Ref.	:	Tanjong Rimau	Date Reported	:	05/11/2025

Customer Ref. No. : -
Customer Name : Camphora Pte Ltd
Customer Address : 5000A Marine Parade Road
Block 5000A
Singapore 449284

Attention To : Mr Derek Yap / Ms Sheryl Seet

Subject : **Vibration Monitoring at Tanjong Rimau**

Description : Vibration Monitoring at 2 locations on 14/10/2025 & 16/10/2025

Toh Teck Yeow
Snr Manager, Env Services

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SCOPE OF WORK

Vibration Monitoring was carried out at 2 locations for 24 hours. The description of location and scope of work are as described in Table 1.

Table 1: Scope of work carried out

Location ID	Instrument SN	Monitoring Period	Monitoring Parameters & Data
V1	654949	16/10/2025 0000hrs to 16/10/2025 2359hrs	PPV (mm/s) Frequency (Hz) X, Y & Z Axes
V2	654949	14/10/2025 0000hrs to 14/10/2025 2359hrs	

Table 2: Monitoring Locations

Location ID	GPS Coordinates
V1	1°15'34.5"N 103°48'26.8"E
V2	1°15'24.8"N 103°48'32.4"E

MONITORING LOCATIONS

The monitoring locations are shown in the map image below. Refer to R251 0229/2 Appendix A for site photos.

SAMPLING METHODOLOGY AND EQUIPMENT

Vibration monitoring was carried out using MIT Wireless Vibration Meter using Monnit ALTA Sensors housed in an environmental enclosure for field deployment. It uses an integrated triaxial accelerometer to measure vibration speed and frequency and report on 3 axes. Refer to Appendix B for the calibration certificates.

MONITORING RESULTS

The below data is the summary of maximum detected vibrations compared against the DIN 4150 Guidelines for short term vibration on structures. Raw data has been submitted electronically.

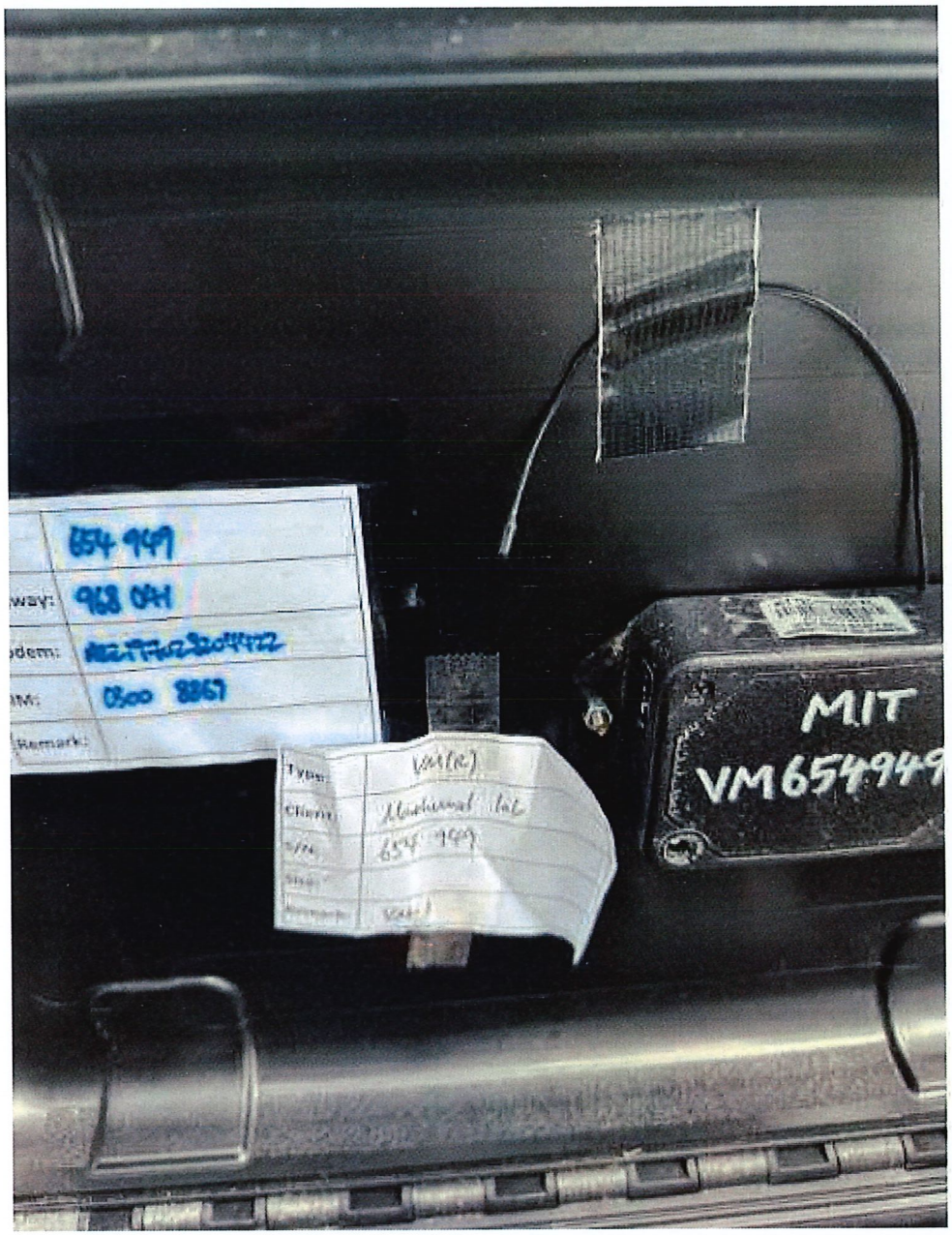
Maximum detected Vibration at V1	X-Axis	Y-Axis	Z-Axis	Buildings used for commercial purposes, industrial buildings, and buildings of similar		
Dominant Frequency (Hz)	7	8	7	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz
PPV (mm/s)	1.3	1.4	2.2	20 mm/s	20 to 40 mm/s	40 to 50 mm/s
Date of Detection	16/10/2025	16/10/2025	16/10/2025			
Time of Detection	3:07	13:27	18:27			

Maximum detected Vibration at V2	X-Axis	Y-Axis	Z-Axis	Buildings used for commercial purposes, industrial buildings, and buildings of similar		
Dominant Frequency (Hz)	14	8	8	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz
PPV (mm/s)	1.4	3.2	7.8	20 mm/s	20 to 40 mm/s	40 to 50 mm/s
Date of Detection	14/10/2025	14/10/2025	14/10/2025			
Time of Detection	14:57	14:57	14:57			

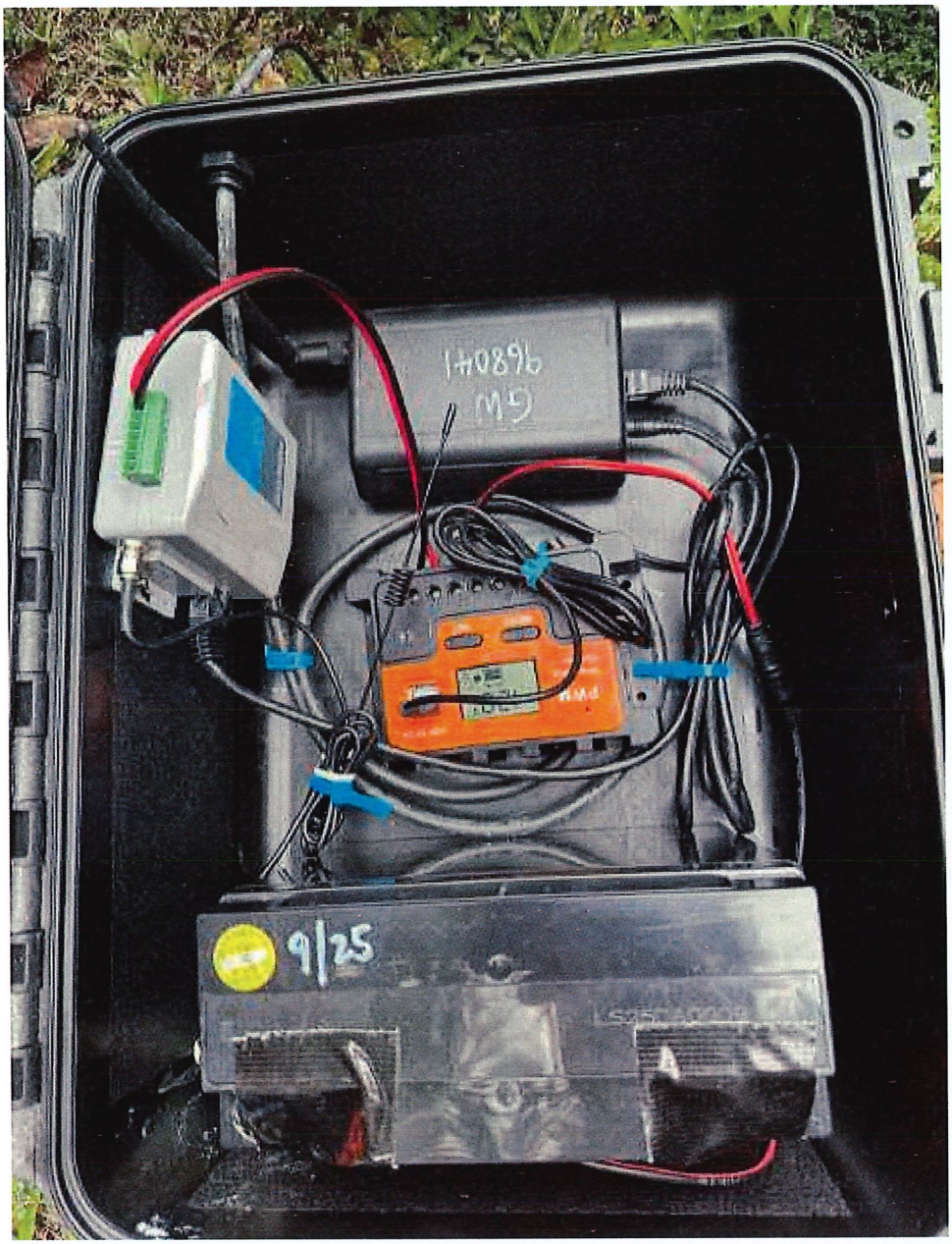
Photos: Vibration Monitoring Station at V1 (16/10/2025)

Photos: Vibration Monitoring Station at V2 (14/10/2025)

Photos: Interior of Vibration Meter Enclosure 1



Photos: Interior of Vibration Meter Enclosure



GRACECAL PTE LTD
31 Woodlands Close, #02-05 Woodlands Horizon, Singapore 737855
Tel: 67423850 Fax: 67423849 Email: sales@gracecal.com
Website: www.gracecal.com

CALIBRATION CERTIFICATE

CLIENT	**: TO WHOM IT MAY CONCERN**	**CERTIFICATE NO**	**: GCC251675**
		ISSUE DATE	**: 13-AUG-2025**
		WORKS ORDER NO	**: GWO251904**
INSTRUMENT	**: VIBRATION METER**		
MAKE	**: -----**		
MODEL NO.	**: -----**	**DATE CALIBRATED**	**: 13-AUG-2025**
TAG NO.	**: -----**	**DUE DATE**	**: 13-AUG-2026**
SERIAL NO.	**: 654949**		
AMBIENT TEMPERATURE:		**RANGE**	**: -------**
(23 ± 5) °C		**GRADUATION**	**: -------**
RELATIVE HUMIDITY:		**(TAG NO.)**	**: -------**
(55 ± 10) % r.h.		**PAGE**	**: 1 of 2**
		STATUS	**: AS FOUND**

The described instrument has been calibrated at Laboratory under the ambient conditions stated above.

The reference measurement standards used are traceable to National Metrology Centre (**NMC**), Singapore or National Physical Laboratory (**NPL**), UK or National Institute of Standards and Technology (**NIST**), USA or other recognized National or International Standards Laboratories.

The Instrument was calibrated by comparison with laboratory calibration testing equipment.

Equipment: Vibration Calibration System

Serial No: 258679

Calibration Method

Calibration Method is in accordance with **ISO/IEC 17025**. The calibration method was carried out according to In-house Technical Calibration Procedure AS-TM-MS02 as a guide.

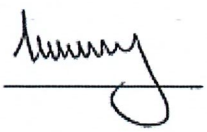
Calibration Results

1. The results of calibration are given on the attached calibration data sheet(s).
2. The expanded uncertainty of measurement associated with the calibration is 0.3% estimated at a confidence level of approximately 95% with a coverage factor of k=2.00. The statement of compliance is made without taking measurement uncertainty into account and is based on Instrument's performance against required accuracy only.
3. The user should determine the suitability of the instrument for its intended use.

Calibrated By:

PREM

ID: 748656



Approved By:

KUMAR

ID: 748670

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CALIBRATION CERTIFICATE

CERTIFICATE NO : GCC251675
ISSUED DATE : 13-AUG-2025
WORKS ORDER NO : GWO251904
PAGE : 2 of 2

ACTUAL VALUE	MEAN INSTRUMENT READING		
	Before Adjustment	After Adjustment	Correction
Velocity Measurement @ 10 Hz (RMS)			
3.13	3.3	---	-0.17
8.34	8.1	---	-0.24
14.95	15.2	---	-0.25
23.91	24.7	---	-0.79