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NSW Department of Education

Quarterly Subsurface Gas Monitoring Report – Q1 2025

Cringila Public School – 35 Sheffield Street, Cringila NSW

April 2025

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Quarterly Subsurface Gas Monitoring Report – Q1 2025
Cringila Public School – 35 Sheffield Street, Cringila NSW

NSW Department of Education

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Approved by:	James Robinson	28/04/2025	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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1 Introduction

This report summarises the findings of the Q1 2025 quarterly round of subsurface gas monitoring carried out at Cringila Public School, located at 35 Sheffield Street, Cringila NSW (refer Figure 1 in Appendix A for site layout).

The works were undertaken on 27 of March 2025. The work forms part of an ongoing monitoring program prepared for the site in response to a Clean-Up Notice issued to the site (Notice No. 1557944, dated 25 October 2017). Works were undertaken in conjunction with quarterly near-surface and in-situ temperature monitoring and ambient air quality monitoring for the purpose of assessing subsurface gas risk associated with combusting coal fill processes identified within the former north-western hotspot area within the school grounds.

2 Climatic Conditions

Daily meteorological data obtained from the Albion Park Weather (Wollongong Airport) (station 068241) was collected a week prior to and during the monitoring round to provide meteorological data and to assist in accounting for changes in gas concentrations between monitoring events.

The weather station is situated approximately 14 km south of the site. Table 2.1 below summarises the meteorological variation experienced in the vicinity of the site leading up to and during the monitoring event.

Table 2.1 Weather Observations – Albion Park (station 068241)

Date	Temperature		Rainfall	Wind Parameters				Barometric Pressure	
	9am	3pm		9am		3pm		9am	3pm
	°C	°C	mm	Direction	Speed (km/hr)	Direction	Speed (km/hr)	hPa	hPa
21/03/2025	21.8	26.6	0	SSE	2	NE	17	1014.6	1012.1
22/03/2025	19.6	23.2	5.8	N	2	ESE	15	1017.7	1016.6
23/03/2025	21.1	21.4	0.0	SSW	9	WNW	11	1021.2	1020.1
24/03/2025	21.3	25.5	0.2	Calm	Calm	NE	17	1020.8	1019.1
25/03/2025	21.0	26.4	0.0	W	7	ENE	15	1022.9	1021.5
26/03/2025	21.1	27.0	0.2	Calm	Calm	ENE	22	1022.7	1021.0
27/03/2025	17.1	25.0	0.0	WSW	6	SSE	13	1023.4	1022.5

The weather observations (as demonstrated in Table 2.1 above) indicate the following:

- Temperatures during the week prior to and on the morning of monitoring showed mild weather for the week prior to monitoring;
- Moderate rainfall was recorded on the 22 of March with very little other days.
- Low wind speeds (<10km/h) were recorded on all mornings prior to monitoring. Relatively strong wind speeds (> 10km/h) were recorded on all afternoons.
- Barometric pressure fluctuated throughout the week prior to monitoring, with pressures starting low on the 21 of March before rising to high pressure on the 27 of March.

3 Fieldwork Methodology

Fieldwork was undertaken on 27 of March 2025. Monitoring was carried out using a calibrated GA5000 Landfill Gas Meter (calibration certificates are provided in Appendix B).

3.1 Subsurface Gas Wells

The monitoring ports of the GA5000 were fitted to the X-cap of each of the nine (GG1 to GG9) subsurface monitoring wells. Subsurface gas and flow rate were recorded as well as concentrations of the following hazardous gases (refer to Figure 2 of Appendix A for monitoring locations):

- Methane (CH_4) - (%v/v): Maximum and stable concentrations;
- Carbon Dioxide (CO_2) - (%v/v): Maximum and stable concentrations;
- Oxygen (O_2) - (%v/v): Minimum and stable concentrations;
- Carbon Monoxide (CO) - (ppm): Maximum concentration;
- Hydrogen Sulphide (H_2S) - (ppm): Maximum concentration;
- Relative pressure (mbar);
- Atmospheric pressure (mbar);
- Balance (v/v%); and
- Flow rate (L/hr): stabilised concentration (within subsurface gas monitoring wells only).

3.2 Service Pits

Service pits were assessed by inserting the GA5000 nozzle into the pits with the sampling tube inserted at least 30 cm below the cover grate for a minimum of 30 seconds. The locations of service pits monitored (P1 to P12) are presented in Figure 2 of Appendix A.

4 Assessment Criteria

4.1 Criteria for Ground Gases

Criteria for ground gases in gas monitoring wells was selected based on the threshold levels presented in *Solid Waste Landfills Guideline* (NSW EPA 2016) and presented below in Table 4.1.

Table 4.1 Threshold Levels for Hazardous Gases

Analyte	Threshold level reference	Unit	Threshold Level	Comments
CH_4	NSW EPA 2016 (1)	% (volume/volume)	1.0	The threshold level for further investigation and corrective action
CO_2			1.5	

Notes [1] The threshold levels for further investigation and corrective action are detection of methane at concentrations above 1% (volume/volume) carbon dioxide at concentrations of 1.5% (volume/volume) above established natural background levels.

When the above-mentioned levels are exceeded, further characterisation of the obtained values through the calculation of Gas Screening Values (GSV) will be required. Both on-site and off-site risk associated with subsurface landfill gas is further characterised through the calculation of the GSV. Using both the total concentration and flow rate, the level of risk associated with any identified subsurface gas concentrations at each of these locations can be assessed. The method of deriving a GSV and associated landfill gas risk has been adopted by the calculations below specified in the Modified Wilson and Card classification *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases* (NSW EPA 2012).

GSV refer to the concentrations of CH_4 or CO_2 gas measured in a monitoring well multiplied by the measured borehole flow rate.

Table 4.2 below presents a summary of the Modified Wilson and Card classification used to calculate GSV and Characteristic Situation (CS) as well as the risk classification in accordance with the Guideline.

Table 4.2 GSV and CS and Characterising Landfill Gas Risk (NSW EPA 2012)

Gas Screening Value Threshold (L/hr)	Characteristic Gas Situation	Risk Classification	Additional Factors
<0.07	**1**	Very low risk	Typically, CH_4 <1% v/v and/or CO_2 <5% v/v, otherwise consider increase to Situation 2[1]
<0.7	**2**	Low risk	Borehole flow rate not to exceed 70L/hr otherwise consider increase to Situation 3
<3.5	**3**	Moderate risk	-
<15	**4**	Moderate to high risk	Consider need for Level 3 risk assessment
<70	**5**	High risk	Level 3 risk assessment required
>70	**6**	Very high risk	

Applicable Gas criteria for service pits is presented below in Table 4.3.

Table 4.3 Threshold Levels for Service Pits

Analyte	Threshold level reference	Unit	Threshold Level	Comments
CH_4	NSW EPA 2016 (1)	% (volume/volume)	1.0	The threshold level for further investigation and corrective action
CO_2			1.5	
CO_2	Safe Work Australia HCIS (2)	ppm	TWA: 5000 STEL: 30,000	Workplace Exposure Standards — Only applicable to service pits to assess risks for utility workers — Not applicable for ground gas
H_2S	Safe Work Australia HCIS (2)	ppm	TWA: 10 STEL: 15	
CO	Safe Work Australia HCIS (2)	ppm	TWA: 30	

[1] This was discussed in the scope of the Phase 2 Environmental Site Assessment (Greencap 2018), as indoor monitoring at School Building is regularly undertaken and results obtained so far did not indicate any gas intrusion, GSV values obtained during this monitoring program that are less than 0.07 will be considered as Very Low Risk.

[2] Safework Australia Hazardous Chemical Information System (HCIS)

5 Monitoring Results

5.1 Subsurface Gas Well Monitoring

A summary of the subsurface gas well results is presented below in Table 5.1 and discussed below:

- Measured flow rates recorded in all subsurface monitoring wells were consistently between 0.0L/hr and 0.1L/hr;
- CH_4 was not detected in any subsurface monitoring wells;
- CO_2 was detected in exceedance of the adopted NSW EPA (2016) threshold in monitoring wells GG3, GG5, GG6, GG7 and GG9. As the measured flow rates in the wells were all <0.1L/hr, gas screening values were all "very low risk";
- CO was not detected in any monitoring wells. H_2S was detected in wells GG3, GG4, GG5, GG6 and GG7 at very low levels of concentration; and
- O_2 concentrations ranged between 11.6%v/v (GG9) and 19.8%v/v (GG4).

Due to access constraints, subsurface monitoring wells GG1 and GG2 could not be assessed during the Q1 2025 monitoring round. Monitoring well GG8 was previously found to have penetrated an underground sewer pipe and has been removed (past gas results for well GG8 should also be considered inaccurate).

5.2 Characteristic Gas Situation

GSVs calculated for CH_4 and CO_2 in each of the monitored wells indicated a Characteristic Gas Situation of CS1 "Very Low Risk" according to the Modified Wilson and Card classification method presented in Table 4.2.

Table 5.1 Subsurface Gas Results

Well ID	Monitoring Date	Time	Relative Pressure (mb)	Stable Flow Rate (L/hr)	Methane		Gas Screening Value	Carbon Dioxide		Gas Screening Value	Oxygen (%v/v)	Carbon Monoxide (ppm)	Hydrogen Sulfide (ppm)	Balance (%)	Barometric Pressure (mBar)
					Peak (%v/v)	Stable (%v/v)		Peak (%v/v)	Stable (%v/v)						
GG1	26/03/2025														
GG2	26/03/2025														
GG3	26/03/2025	9:25	0.05	0.0	0.0	0.0	0.00	4.4	4.4	0.00	15.7	0	1	79.6	1016
GG4	26/03/2025	9:23	0.12	0.0	0.0	0.0	0.00	0.3	0.3	0.00	19.8	0	1	79.8	1017
GG5	26/03/2025	9:43	-0.11	0.1	0.0	0.0	0.00	3.8	3.8	0.00	16.9	0	1	79.2	1017
GG6	26/03/2025	9:50	0.40	0.0	0.0	0.0	0.00	3.5	3.5	0.00	16.9	0	1	79.6	1017
GG7	26/03/2025	10:05	-0.02	0.0	0.0	0.0	0.00	4.4	4.4	0.00	15.8	0	1	79.7	1018
GG8	26/03/2025														
GG9	26/03/2025	10:11	0.07	0.0	0.0	0.0	0.00	8.7	8.7	0.00	11.6	0	0	79.9	1018

Hazardous Ground Gas Guideline Criteria

	Denotes Characteristic Gas Situation of 1 (NSW EPA (2012), *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*)
	Denotes Characteristic Gas Situation of 2 (NSW EPA (2012), *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*)
	Denotes Characteristic Gas Situation of 3 (NSW EPA (2012), *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*)
	Elevated above the 1% volume criteria for CH_4 and 1.5% for CO_2 presented in the NSW EPA *Solid Waste Landfill Guidelines (2016)*

5.3 Service Pits

A total of 10 service pits were monitored in the field for potential accumulated or venting gases. Gas readings were taken from within the service pits, as well as above the service pits (approximately 1m directly above). A summary of gas results from within and above service pits is presented in Table 5.2 and discussed below:

- CH_4, CO and H_2S were not detected above or within any of the accessible service pits;
- CO_2 was detected in low concentrations in service pit P1 (up to 0.1%); and
- Due to access constraints, service pits P2, and 5 and within P11 and P12 could not be assessed during Q1 2025.

Table 5.2 Service Pit Gas Results

Service Pit		Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Carbon monoxide (ppm)	Hydrogen sulfide (ppm)
P1	(1m above pit)	0.0	0.1	20.4	0.0	0.0
	(within pit)	0.0	0.0	20.4	0.0	0.0
P2	(1m above pit)	Inaccessible				
	(within pit)					
P3	(1m above pit)	0.0	0.0	20.4	0.0	0.0
	(within pit)	0.0	0.0	20.4	0.0	0.0
P4	(1m above pit)	0.0	0.0	20.4	0.0	0.0
	(within pit)	0.0	0.0	20.4	0.0	0.0
P5	(1m above pit)	Inaccessible				
	(within pit)					
P6	(1m above pit)	0.0	0.0	20.4	0.0	0.0
	(within pit)	0.0	0.0	20.4	0.0	0.0
P7	(1m above pit)	0.0	0.0	20.3	0.0	0.0
	(within pit)	0.0	0.0	20.3	0.0	0.0
P8	(1m above pit)	0.0	0.0	20.3	0.0	0.0
	(within pit)	0.0	0.0	20.3	0.0	0.0
P9	(1m above pit)	0.0	0.0	20.3	0.0	0.0
	(within pit)	0.0	0.0	20.3	0.0	0.0
P10	(1m above pit)	0.0	0.0	20.2	0.0	0.0
	(within pit)	0.0	0.0	20.2	0.0	0.0
P11	(1m above pit)	0.0	0.0	20.4	0.0	0.0
	(within pit)	Inaccessible				
P12	(1m above pit)	0.0	0.0	20.4	0.0	0.0
	(within pit)	Inaccessible				

6 Quarterly Site Inspection Checklist

During the quarterly subsurface gas monitoring round, a quarterly site inspection checklist is also completed. Refer to the Quarterly Site Inspection Checklist for Q1 2025 for details.

7 Findings

The main findings of this subsurface gas monitoring round can be summarised as follows:

- All monitoring wells had a Characteristic Gas Situation of 1 (Very Low Risk). Therefore, detections of CO_2 and CH_4 are not considered to pose a risk to site users or nearby receptors; and
- Results have indicated that gas emissions from service pits were below relevant criteria and indicative of background concentrations.

8 Conclusions

Results of this monitoring round indicate the site is Very Low Risk. No unacceptable risk to human health and/or environment was identified during the Q1 2025 monitoring round.

9 Limitations Statement

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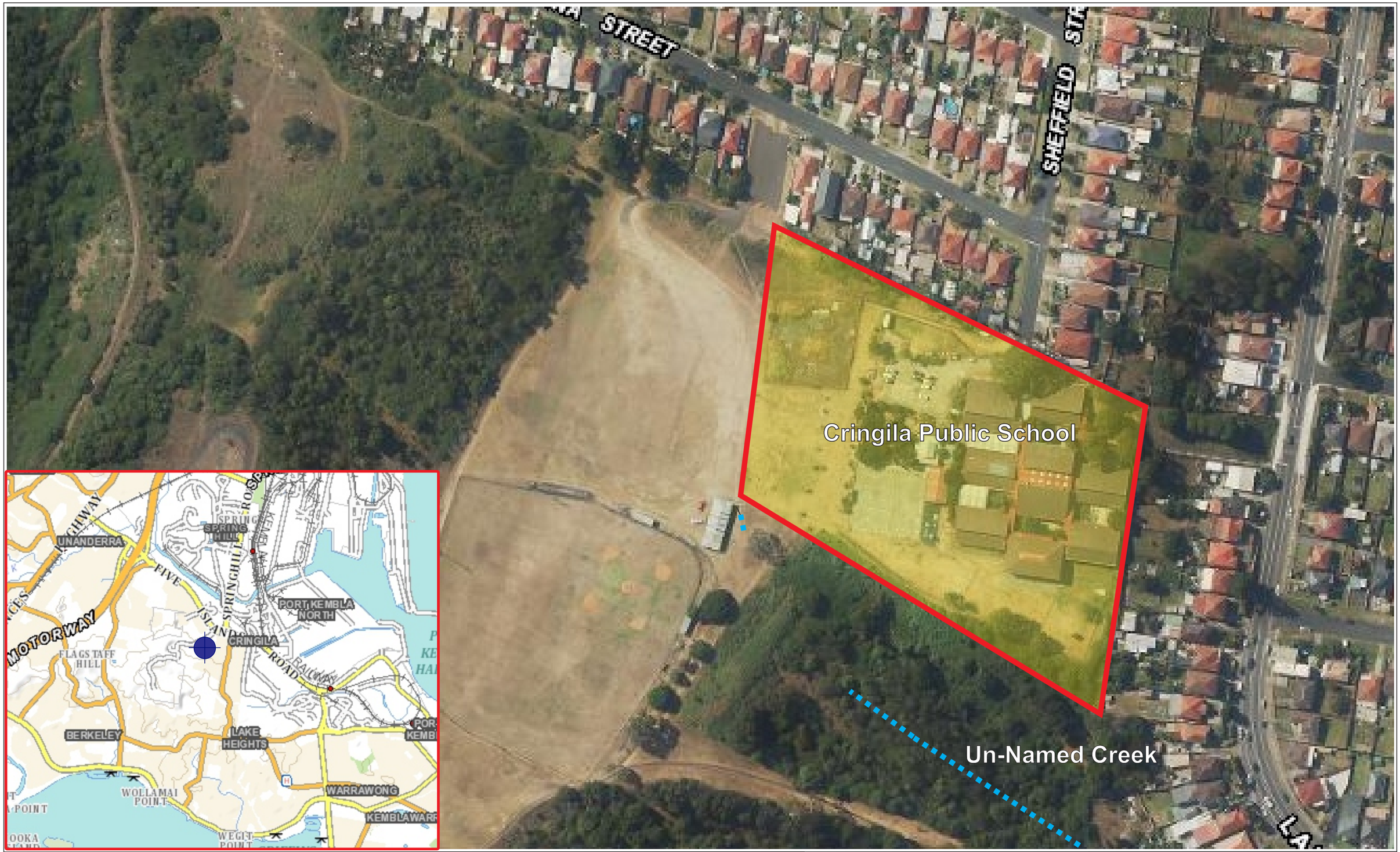
Appendix A

Figures



Legend:

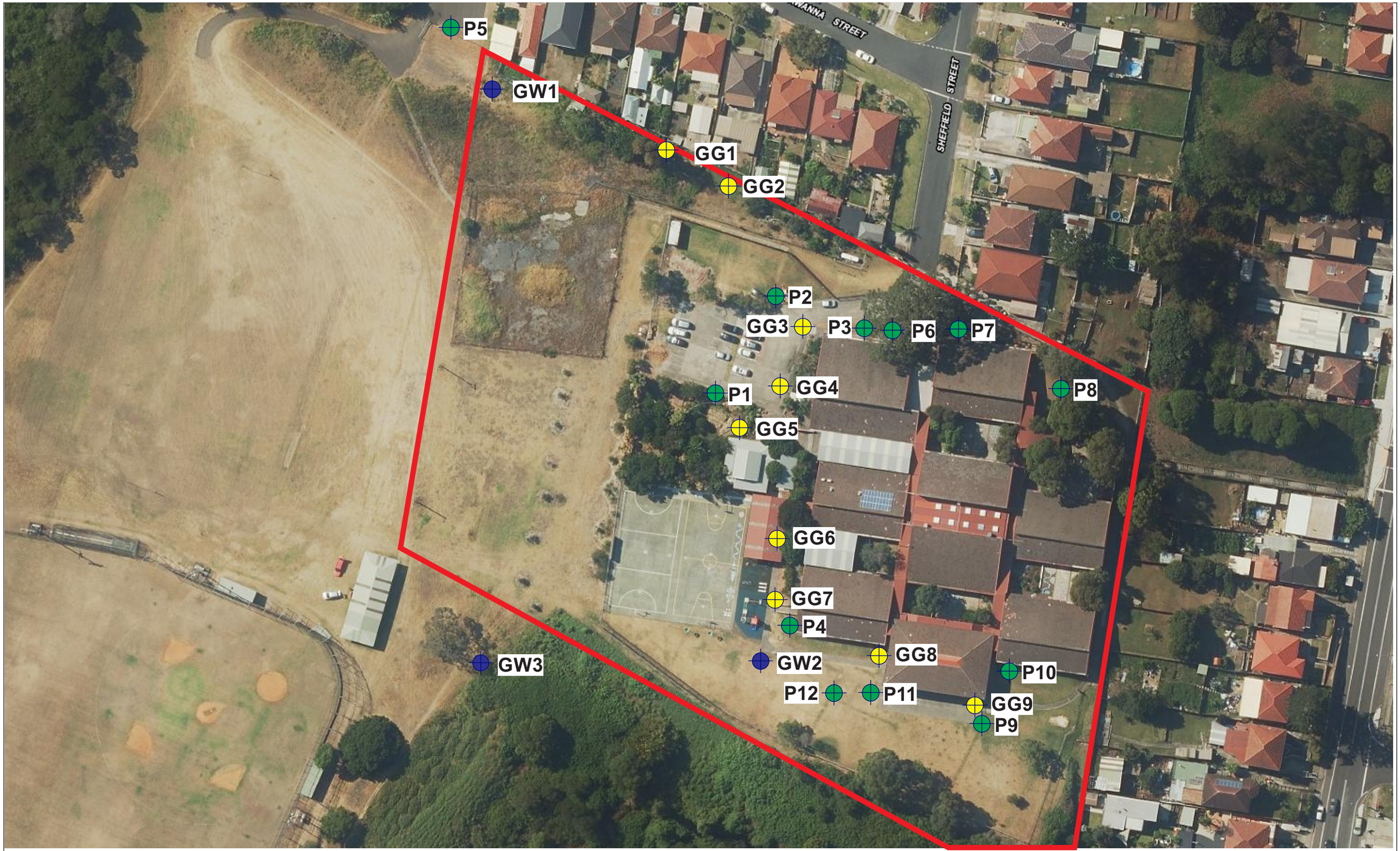
- Site Boundary
- Drainage

Metres
0 10 20 30 80

GREENCAP
Going Further in Managing Risk

Level 2, 11-17 Khartoum Road
North Ryde, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	Department of Education				
Client Number:	C107471	Project Number:	J155958		
Project Description:	Monthly Monitoring Report- Cringila Public School				
Address:	Cringila Public School				
Prepared:	AMW	Reviewed:	MB	Date:	19/06/2018
Figure 1	Site Location and Regional Context				



Legend:

- Site Boundary
- Groundwater Monitoring Well
- Ground Gas Monitoring Well
- Service Pit Location

Metres

0 10 20 30 80

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Level 2, 11-17 Khartoum Road
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Ph: 02-9889-1800
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Client Name:	Department of Education				
Client Number:	C107471	Project Number:	J155958-01		
Project Description:	Monthly Monitoring Report - Cringila Public School				
Address:	Cringila Public School				
Prepared:	AMW	Reviewed:	MB	Date:	19/06/2018
Figure 2	Groundwater Well, Gas Well and Service Pit Locations				

Appendix B

Calibration Certificates

28/11/2024

Gas Calibration Certificate

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Instrument GA5000
Serial No. G508339
Sensors CH4, CO2, O2, CO, H2S

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
Pump	Operation	✓	
	Filter	✓	
	Flow	✓	
	Valves, Diaphragm	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	O2	✓	
	CH4	✓	
	CO2	✓	
	CO	✓	
	H2S	✓	
Alarms	Beeper	✓	
	Settings	✓	
Software	Version		
Datalogger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
O2		20.9% O2		Fresh Air	20.9% O2
CH4		60% CH4	NATA	SY644	60% CH4
CO2		40% CO2	NATA	SY644	39.9% CO2
CO		100ppm CO	NATA	SY653	100 ppm CO
H2S		25ppm H2S	NATA	SY653	25 ppm H2S

Calibrated by: Nausheen Mazari

Calibration date: 28/11/2024

Next calibration due: 28/12/2024

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