Our Ref C5334/25/E/GM
30th January 2026

Holroyd Homes (Yorkshire) Ltd
The Studio
Rear of 14 Park Drive
Huddersfield
West Yorkshire
HD1 4EB

For the attention of Jack Holroyd,

Dear Sir,

Ref: Gas Monitoring at Hinchliffe Mill, Holmbridge

Further to our report on a geo-environmental investigation (C5334/25/E/8207) which was presented in November 2025, we have now completed the gas monitoring and present our findings.

Monitoring

Gas monitoring standpipes were installed in the windowless sample boreholes, the locations of which are provided on the site plan presented as Appendix 1 of the geo-environmental report. Visits were made to the site between the 5th November 2025 and 8th January 2026. The results of this work are tabulated below:

Table 1: Gas Monitoring

Location	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	Flow	Barometric Pressure (mb)	Water Level (m)	Standpipe Depth (m)
WS01	05.11.2025	0.0	0.5	20.3	0.0	1004↔	Dry	1.2
	12.11.2025	0.0	0.6	20.3	0.0	998↔	Dry	
	19.11.2025	0.0	0.6	19.7	0.0	1008↑	Dry	
	27.11.2025	0.0	0.6	19.1	0.0	1016↑	Dry	
	11.12.2025	0.0	0.4	20.2	0.0	1014↔	Dry	
	08.01.2026	0.0	0.5	19.4	0.0	998↑	Dry	
WS02	05.11.2025	0.0	0.7	19.9	0.0	1004↔	0.25	1.0
	12.11.2025	0.0	1.0	19.2	0.0	998↔	0.35	
	19.11.2025	0.0	0.8	19.5	0.0	1008↑	0.15	
	27.11.2025	0.0	0.5	19.0	0.0	1016↑	0.20	
	*	*	*	*	*	*	*	
	*	*	*	*	*	*	*	
WS03	05.11.2025	0.0	0.9	14.3	0.0	1004↔	1.14	1.2
	12.11.2025	0.0	2.0	11.1	0.0	998↔	1.11	
	19.11.2025	0.0	1.7	12.4	0.0	1008↑	0.79	
	27.11.2025	0.0	1.5	13.8	0.4	1016↑	1.00	
	11.12.2025	0.0	2.8	9.4	0.1	1014↔	0.77	
	08.01.2026	0.0	0.5	19.4	0.0	998↑	Dry	

↑ rising pressure ↓ falling pressure → steady pressure *standpipe buried/damaged

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The monitoring visits prior to the 27th November 2025 were undertaken using a GFM Series (serial No 13747/270525) which was last calibrated on the 27th May 2025. The visits on, and after, the 11th December 2025, were also carried out with a GFM Series machine, albeit that machine was last calibrated on the 13th January 2025 (and has the serial No. 12168). In both instances, the calibration period lasts for a period of 12 months.

Gas Concentrations

With respect to ground gas, the results of the completed monitoring regime indicated nominal methane, with concentrations of carbon dioxide ranging between 0.4% and 2.8% in association with oxygen levels of between 9.4% and 20.3%. It should be appreciated that on non-contaminated sites there is generally about 20% by volume of oxygen, associated with low levels of carbon dioxide. In addition, a maximum flow rate of 0.4 litres per hour was recorded and should be employed in the any calculations.

The principal driving force for initiating the movement of gas in the ground is a change in barometric pressure. The most onerous gas condition on a site is usually observed on days of low or falling barometric pressure, preferably below 1000mb. It has been noted that measurements undertaken solely during high pressure conditions may be of lesser value. At this site the readings undertaken to date were at atmospheric pressures of between 998mb and 1016mb.

In view of the above, it may be appreciated that the continued gas monitoring has revealed no increases in methane concentrations or flow rates. However, levels of carbon dioxide have increased slightly during the extended monitoring, therefore, the risk assessment and remediation strategy provided in the geo-environmental report should be considered with the comments below.

Risk Assessment

In order to establish the gas screening value (GSV) for carbon dioxide or methane, the maximum gas concentration (expressed as a decimal) is multiplied by the borehole flow rate (l/hr). In this case 0% methane was recorded along with 2.8% (0.028) carbon dioxide, in association with a maximum flow rate of 0.4 l/hr. This results in a GSV of 0 l/hr for methane and a GSV of 0.0112 l/hr for carbon dioxide.

In accordance with Table 8.5, *Modified Wilson and Card classification* of the CIRIA report C665, *Assessing risks posed by ground gasses to building,* the site may be characterised as Characteristic Situation Level *1*. It is therefore considered that there is a low risk of harm to end users and site operatives and no special precautionary measures are required in accordance to Table 8.6, *Typical scope of gas protection measures,* of CIRIA report C665.

With regard to the number of monitoring visits required reference is made to Tables 5.5a and 5.5b of CIRIA report C665 (2007)[1].

[1] Adapted from tables 5.5a and 5.5b of CIRIA C665, 2007, *Assessing risks posed by hazardous ground gas to buildings, p60.*

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Accepting that the proposed development is of high sensitivity (residential) and that the generation potential is very low, these tables suggest that 6 readings could be undertaken over a period of at least 3 months. However, C665 notes that *not all sites will require gas monitoring for the period and frequency indicated in Tables 5.5a and 5.5b.* In this case, a total of 6 monitoring visits were undertaken over a 3 month time period.

In view of the above it is considered that with respect to gas monitoring, the site is fully characterised.

Remediation Strategy for Ground Gas

As a consequence of the above, the site may be characterised as Characteristic Situation Level 1. This conclusion was provisionally considered in the geo-environmental report. However, on the basis that further monitoring would be necessary to fully characterise the site, recommendations were discussed regarding protection appropriate for *Characteristic Situation Level 2*. This was to ensure that the most onerous possible costs were considered but also to provide appropriate recommendations in case the further monitoring could not be completed. In this instance, it should be appreciated that the final monitoring regime has reinforced the characterisation of a low risk. As such, no specific remediation will be required to protect against bulk ground gases.

References

- British Standards Institution (2013), BS 8576 Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds.
- British Standards Institution (2015 +A1:2019) BS8485: *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings,* B.S.I., London.
- CIRIA Report C665, *Assessing risks posed by ground gasses to building.*

We trust that this information is of interest and should you have any other requirements do not hesitate to contact us.

For Rogers Geotechnical Services Ltd,

Yours Faithfully,

Rob Palmer MSc FGS ACIEH
Engineering Director

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Test Certificate

Customer:	Ribble Enviro Hire Fleet
Instrument:	GFM Series
Job:	Pre-Hire Test
Serial number:	13747
Fleet Number:	GAS0016
Certificate no:	13747 / 270525
Tested on:	27 May 2025
Tested for:	Methane, Carbon Dioxide, Oxygen, hydrogen Sulphide, Carbon Monoxide, Hexane

Applied Gas Concentration:	Cylinder Reference:	Final Sensor Reading	Pass / Fail
Hexane: 0.3% Vol	52687 / 2416	0.275% vol	Pass
CO2: 50% Vol	9750-11-1	50.1% vol	Pass
CO: 500 ppm	199242	460 ppm	Pass
H2S: 50 ppm	199242	60 ppm	Pass
O2: 18% Vol	199242	17.9% vol	Pass
CH4: 2.5% Vol	199242	2.4% vol	Pass

The instrument has been calibrated after re-zeroing and introducing span calibration gas, using gas that is traceable to national standards and has been prepared in accordance with BS EN ISO 6145-6:2017

Calibration Engineer: BRADLEY HAYHURST

Sign:

Tel: 01200 445 804 **Fax**: 01200 445 809 **Email**: info@ribble-enviro.co.uk
Ribble Enviro Ltd. Unit 4, Gisburn Business Park, Gisburn, Nr Clitheroe, BB7 4JP, UK

TEST DATE AND CONDITIONS		
Date	20/11/2024	
Atmospheric Pressure	992	mB
Ambient Temperature	21.5	°C
Environics Serial No.	5089	

GAS DATA LTD

Unit D

Earlplace Business Park

Fletchamstead Highway

Coventry

CV4 9XL

Tel 02476303311 Fax 02476307711

GFM436 Final Inspection & Calibration Check Certificate

Customer	Ribble Enviro Ltd
Certificate Number	125695
Order Number	340317

Serial Number	13747
Software Version	G436-00.00/00

Recalibration DUE Date
20/11/25

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	500	*Accept > 200 cc/min*	Pump Flow @ -200mB	300	*Accept > 200 cc/min*
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
	CH_4		CO_2		O_2	
Sensor	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %
	60.7 *Accept ±3.0*	*60*	39.7 *Accept ±3.0*	*40*	20.9 *Accept ±0.5*	*20.9*
	5.0 *Accept ±0.3*	*5*	5.0 *Accept ±0.3*	*5*	6.0 *Accept ±0.3*	*6*
Zero Reading 100% N2	0.0 *Accept ±0.0*	*0*	0.0 *Accept ±0.0*	*0*	0.0 *Accept ±0.1*	*0*

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings *(ppm)*			
			Zero Reading		Instrument Gas Reading	
Gas Type	Range *(ppm)*					
H2S	5000	*1500*	0	*Accept ±0.0*	1500	*Accept ±5.0%*
CO	2000	*1000*	0	*Accept ±0.0*	1002	*Accept ±5.0%*
Hexane	*2.0%*	2.0%	0	*Accept ±0.0*	1.99	*Accept ±10.0%*

Cross Gas Effects									
Applied Gas *(ppm)*		Instrument Readings *(ppm)*							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	*1500*	1500		0		0			
CO	*1000*	90		1002		0			
Hexane	*2.0%*	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] *(mB)*			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		991	*Accept ±2.0*
AP Port (Internal)	*+600 mB*	800	*Accept ±5.0*
	+1200mb	1200	*Accept ±5.0*

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading *(l/h)*	Instrument Reading *(l/h)*		Applied Pressure *(Pa)*	Instrument Reading *(Pa)*	
-30	-30.1	*Accept ±3.0*	-432	-436	*Accept ±50*
-3	-3.0	*Accept ±1.0*	-19	-19	*Accept ±6.0*
0	0.0	*Accept ±0.0*	0	0	*Accept ±0.5*
3	3.0	*Accept ±0.5*	16	16	*Accept ±3.0*
30	29.8	*Accept ±3.0*	363	360	*Accept ±50*
60	59.8	*Accept ±6.0*	1115	1111	*Accept ±130*
90	91.8	*Accept ±9.0*	2196	2296	*Accept ±250*

Temperature Checks		
Calibration Temperature Applied Temperature °C	Instrument Temperature Reading °C	
-10	-10.0	*Accept ±2.0*
0	0.0	*Accept ±1.0*
30	30.0	*Accept ±1.0*
60	60.0	*Accept ±1.0*
100	100.0	*Accept ±1.0*

Technician:	Date Tested:
Jack Rutland	*20/11/2024*

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018.